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TECHNICAL REPORT 4911

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HENRY E. HUDGINS, JR.

**JANUARY 1977** 

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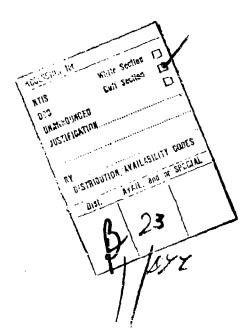
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10000	aerodynamics is also presented. A similar effort for Soviet munitions is reported			
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## NOMENCLATURE

	NOMENCLATORE
A a CG C	projectile reference area, $\pi$ d <sup>2</sup> /4 speed of sound SPIN73 label - center of gravity. calibers from nose rolling moment coefficient, $\ell/1/2\rho V^2 Ad$
CLP	SPIN73 label - see Equation 6
C <sub>m</sub>	pitchin; moment coefficient, m/(1/2pV <sup>2</sup> Ad)
CMA	SPIN73 label - see Equation 3
CMQ	SPIN73 label - see Equation 3
C <sub>N</sub>	normal force coefficient, $N/(1/2\rho V^2A)$
Cn	yawing moment coefficient, n/(1/2pV <sup>2</sup> Ad)
c <sup>'</sup> n	Magnus contribution to C
CNA	SPIN73 label - see Equation 2
CNPA	SPIN73 label - see Equation 5
CNPA3	SPIN73 label - see Equation 5
CNPA5	SPIN73 labei – see Equation 5
CNPA[5]	SPIN73 label - Magnus moment secant slope per radiar at 5° total angle of attack
CPF[1]	SPIN73 label - center of pressure of Magnus force, calibers from nose at 1° total angle of attack
CPF[5]	SPIN73 label - center of pressure of Magnus force, calibers from nose at 5° angle of attack
СЪИ	SPIN73 label - center of pressure of normal force, calibers from nose
СХ	SPIN73 label - zero total angle of attack axial force coefficient, see Equation 1
c <sub>x</sub>	axial force coefficient, $X/(1/2pV^2A)$
CX2	SPIN73 label - see Equation 1
CYPA	SPIN73 label - see Equation 4
Cy	Side force coefficient, $Y/(1/2\rho V^2A)$
c' <sub>y</sub>	Magnus contribution to C

d projectile reference diameter

axial moment of inertia of projectile about axis of

symmetry

transverse moment of mertia of projectile about c.g.

IX SPIN73 label =  $I_A$ IY SPIN73 label =  $I_A$ 

L projectile over-all length

l rolling moment

m pitching moment about c.g

M Mach number, V/a

N normal force

n yawing moment about p.g.

p spin rate

P non-dimensional spin rate, pd/2V

q pitch rate

Q non-dimensional pitch rate, qd/2V

r yaw rate

R non-dimensional yaw rate rd/2V, or range

V flight velocity

W projectile weight

X axial force

Xcg axial distance from projectile nose to center of gravity,

calibers

Y side force

α total angle of attack

ρ air density

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#### INTRODUCTION

This study was undertaken to provide an aeroballistic data base for Project HOWLS (Hostile Weapons Location System), an ARPA initiated task administered by the Lincoln Laboratory of the Massachusetts Institute of Technology. The term aeroballistic here is used in a very broad sense as the study was initially intended to cover both US and USSR projectile characteristics: dimensions and inertial properties, trajectories, zoning, dispersion, and aerodynamic coefficients; control aeroballistics: experimental and analytical status of spinning projectiles with aerodynamic control surfaces (especially canards); present and projected fuze designs; gun launch environments and hardening capabilities (especially sensors); and terminal ballistics and effects: lethality, vulnerability, and sensitivity coefficients.

The tasks discussed above were to have been completed by the end of January 1976 (nine months from the starting date of 1 May). Changes in FY 1976 funding for the entire HOWLS program resulted in Lincoln Laboratory requesting in September that work be halted at that point and that whatever had been accomplished up to that point be reported.

In order to make this report more widely useable, it has been divided into a main report and an addendum. The main report contains no classified information. All of the classified information is in the addendum; this includes some range information on US rounds currently being developed and all of the information on Soviet munitions.

The reprogramming of funds by the HOWLS Project sponsor resulted in funding being directed to other tasks than this one. The effect of this is discussed where appropriate in this report. A useful data base has been created which can be extended to its full capability at a later time.

#### DISCUSSION

#### Aeroballistic Characteristics

### Weapons and Projectiles

The main published sources of information on US Army weapons in use at the present time and the plans for the future are References 1 and 2. These references should certainly be obtained as part of the overall program.

The indirect fire weapons currently considered to be active (some reserve units and US allies may still be using others) are:

- 1. 4.2 inch: M30 Mortan
- 2. 105mm: M101A1 Towed Howitzer, M102 Towed Howitzer (air mobile); M108 Self-Propelled Howitzer (only in some active National Guard and US Army Reserve units)
- 3. 155mm: M109 Self-Propelled Howitzer (conversion to M109A1 expected to be completed by FY 1976, one-half had been converted as of October 1974), M109A1 Self-Propelled Howitzer, M114A1 Towed Howitzer;
- 4. 175mm: M107 Self-Propelled Gun (will be phased out when M110E2 is available)
  - 5. 8-inch: M110 Self-Propelled Howitzer.

The future mix of weapons is expected to be:

1. 4.2 inch: M30 Mortar

2. 105mm: XM204 Toyled Howitzer

3. 155mm: XM198 Towed Howitzer, M109A1 Self-Propelled Howitzer

4. 8-inch: M110E2 Self-Propelled Howitzer

The various types of indirect fire projectiles currently being used in and supplied to the field for these different weapons systems were determined from a variety of sources. Among these sources were: Department of the Army publications (Ref 3-17), Ammunition Development and Engineering Directorate (ADED) at Picatinny Arsenal, Ballistic Research Laboratories, Edgewood Arsenal, and the US Army Field Artillery School. The results are shown in Table 1.

Table 1
Currently active fielded projectiles (US)<sup>a</sup>

Bore size	Projectile designation	Туре
	M329A1	High Explosive (HE)
4.2 Inch	M329A1E1	HE
(Mortar)	M328A1	White Phosphorus (WP)
, ,	. M335A1	Illuminator (Illum)
	M1	HE
	M 60	Gas
	M 60	Smoke
105mm	M 60	WP
	M314A2E1	Illum
	M444	Improved Conventional Munition (ICM)
	M 548	HE, Rocket Assisted (RA)
	M107	HE
	M110	Gas
	M110	WP
	M121A1	Chemical
155mm	M485E1, E2	Illum
	M449, E1, E2	ICM
	M 549	HE, RA
	M454	Atomic
	M483A1	ICM
175mm	M437A1, A2	HE
	M106	HE
	M426	Chemical
8-Inch	M 404	ICM
	M422	Atomic
	M424	HES

<sup>&</sup>lt;sup>a</sup>The corresponding available data for Soviet weapons and projectiles is in Table 1A of the Addendum.

US projectiles not yet released or still under development are listed in Table ?.

Table 2
Projectiles in development (US)

Bore size	Projectile designation	Туре
105mm	XM710	ICM
155mm	XM708E2, E3 XM718/741 XM692/731 XM687 XM712	HE AT (antitank) AP (antipersonnel) Bulk Cannister Cannon Launched Guided Projectile (CLGP)
8-Inch	XM650E4 XM711 XM509 XM736 XM753	HE, RA HE ICM Bulk Cannister Atomic, RA

## Projectile Dimensions and Inertial Properties

This section presents the best data currently available. They represent contributions from many sections of Picalinny Arsenal, Ballistic Research Laboratories, Yuma Proving Ground, and Edgewood Arsenal. It must be realized that both production and developmental projectiles change in these characteristics. Many of the fielded and stock-piled projectiles were developed at a time when close attention to shape and inertial properties was not considered necessary and therefore the measurements available are both town number and old (Ref 18 and 19). Production lots also vary in these characteristics due both to minimal changes made over the years and changes in the method of manufacture and of manufacturer. The developmental projectiles are exactly that and, hence, are subject to changes in properties during the development cycle. All of this is in addition, in both the above cases, to the normal deviations to be expected from round to round. All values given are the nominal values

With these caveats in mind, the projectile dimensions and inertial properties are given in Table 3 to 7. The properties listed are also defined in Figure 1. The tabulated dimensions are all given in calibers (center of gravity is from the nose, where nose means the tip of the fuze and an exterior length of 3.75 inches was used for the fuze) except for the shell diameter (DIA) which is given in inches. Weight is tabulated in pounds and the moments of inertia are in pounds-inches squared. A few shell which are being or have been deleted from the inventory and, therefore, do not appear in Table 1 are included in these tables to provide a more complete data bank.

The data for Soviet projectiles are presented in Table 2A which is in the classified Addendum to this report.

### Zoning

One often hears the nomenclature in this area used loosely and interchangeably. To be exact, a "Charge" is a standardized amount of a particular propellant which produces a desired muzzle velocity for the projectile and weapon under consideration. A "Zone" is the distance on the ground between the range at maximum range quadrant elevation and the range at maximum quadrant elevation for a given charge, projectile, and weapon.

Table 3

Dimensions and inartial properties of 4.2 inch projectiles

PROPERTY≮	M329Al (with/ Without extension)	M328Al (with/ Without extension)	M335Al (with/ Without extension)	M329A1E1
	Ca v			4.10
JOA, CAI				, u
Jer	າດ • <del>• • • • • • • • • • • • • • • • • • </del>			<b>7.3</b> 3
BTL	0.0		<b>1</b>	0.565
(asou) 50X	2.98/2.96		2.91/2.88	2.52
-TMO	0.131			C.131
DRB	1.014			<b>^</b>
OGR	<b>t</b> n			بر. ري
BML	1.35/0.70			0.89£
DBA	0.1			0.34
DBM, cal	0.35			0.31
DIA, inches (meters)	4.191			\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
IA, $1b_2^2$ (kq-m <sup>2</sup> )	65.5/65.5	67.0.757.0 (0.0196/2.0196)	67.1/67.0 (0.0185/0.3.96)	49.0
1T, 1b2in2	775./740.	826./800.	807.7806.	414.
(kg-in_)	(0.227/0.217)	(2.242/0.000)	(5.2.0/0.234)	17701
WGT, 1b	25.7/25.4	28.0/27.8 (125./124.)	26.7/26.5 (119./118.)	20.6 (91.6)
(N)	```\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			

\*See Fig 1 for definitions.

Table 4 Dimensions and inertial properties of 105mm projectiles

XM710	4.72 2.54 0.487 2.98 0.143 6.17 0.00 0.00 (0.021°7) 660. (0.193) 33.1 (147.)
M548El (Launch/ Burn-Out)	4.53 b.22 2.37 2.92 0.456 0.544 2.84 3.28/3.22 5.33 18.6 cap on/ cap on/ cap off) 0.639 0.844 0.649 0.844 73. e7.6/66.0 73. P46./809. (0.214) (0.248/0.237) 33.1 28.5/27.5 (147.) (127./122.)
M444	6.33 6.456 2.84 2.84 2.84 6.33 6.33 7.4.9 7.4.9 7.4.9 7.4.9 7.1.1 1.1.1 (147.)
M314A2c1	4.76 1.78 0.00 2.94 3.11 3.11 87.2 (0.0255) 756. (0.221) 35.0 (156.)
MB4 SHOKE (All)	4.53 2.32 0.740 2.83 0.765 639. (0.197)
M60 GAS	
M51) SMOKE	3.05 3.05 78.1 (0.0229) 782. (C.229) 31.0 (147.)
:160WP	3.01 82.4 (0.0241) 825. (0.241) 34.8 (155.)
М	4.72 2.58 0.487 3.01 1.615 6.17 0.00 4.13 (0.1049) 75.4 (0.0232) 75.4 (0.0232) 762.
PROPERTY*	LOA, cal  OCI BTL XCG (nose) DMF DRB CGR BML DBM, cal DBM, cal DBM, cal DBM, cal T, inches (Reters) IA, inches (Reters) IA, lb_in (Kg-m) IT, lb_in (Kg-m) WGI, lb

\*See Fig 1 for definitions.

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Table 5 Cimensions and inertial properties of 155mm projectiles

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	a so i so	4119 GAS	Mile RMOKE Whate/Colored	M12), 41	M485E1, E2	*449E1	R44981	M549 (Leannet)/ Burn-Out)	P454/455
4.52								5.65	5.59
2.44					2.53			3.01	2.09
0.416					2,498		$\int$	675.0	0.00
2.9		3.03			2.43	2.99	2.38	3.53/3.48	3.59
0.090									C. 132
1.016							1		<u> </u>
10.8	1			7	11.2		1	19.9	9.60
oc									
5,870					0.854			0.845	1.8
0.00									1
6.09? (0.1547)				1	6.095			6.992	
499. (0. 146)	497.	491.	491 /447 (0.144/0.121)	515. (0.151.	487.	475. (0.139)	495.	506./493. 694.7 (0.149/0.141)(0.2033)	694.7
<b>4</b> 31) (1.262)	4481.	4424.	7424./4024. (1.295/1.179)	4643.	3647. (1.045)	3593.	3652. (1.069)	6610,76270. 6707. (1.934/1.835)(1.963)	6:27. (1.963)
95.0 (423.)	96.1	95.0	95.0766.4	99.7	99.0	95.5	96.1	(427,739.2	123 4

\*See Fig 1 for definitions

Table 5 (contd)

PROPERTY*	M483E1	XM718/741	XM692/731	1. 0.1.W.X	XM708E2	XM708E3	_	XY712 (CLGP)	<u>_</u>
							Launc.	Fins F Extended	Fins & Wings
LOA, cal	5.80				5.29	5.is	6.0		
₩ 750	2.84				3.02		1.24		
BTL	0.255				0.593	1	00.0	+	
XCG (nose)	3.64	3.63	3.69	3.61	3.39	3.52	5.17	5.18	
- diwo	0.098			1	060.0		Nose Rad. 0.27		
DRB	1.016					7	1 030		
#50	84.2				19.9		conica!)		
BMI	00.0								
D8.4	0.928				0.844		1.00		
DBM, cal	0.0								
Dia, inches (neters)	6.095				6,092		6.000		
IA, 15 <sub>7</sub> 1n <sup>2</sup> (kg-m <sup>1</sup> )	540.	590.	540.	(44.162)	508. (7.149)	517.	811. (0.237)	(0.262)	917.
IT, 15 <sub>2</sub> in² (kg-m³)	586C. (1.715)	5839.	5930.	6239. (1.823)	4900.	6085.	27930.	28400.	28400. (8.311)
MGT, 11 (N)	.03.0	102.0	103.5	92.5	96.0	96.0	134.6 (598.7)		

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Table 6
Dimensions and inertial properties\* of 175mm projectiles, M437A1, M437A2

LOA, ca	al	5.48
ogr	,	2.93
BTL		1.00
хсс	(nose)	3.50
DMP		0.080
DRB		1.032
OGR		25.0
BML		0.00
DBA		0.713
DBM, c	√ :ai	0.00
DIA, i		6.885 (0.1749)
IA, li (kg-n	Q_in <sup>2</sup>	95 <b>4.</b> (0.279)
IT, 16 (kg-1	ojin <sup>2</sup>	11800. (3.45)
WGT, (N)	lb	147.8 (657.4)

<sup>\*</sup>See Fig 1 for definitions.

Table 7 Dimensions and inertial properties of  $\mathbb{C}^{1+} \mathbb{C}^{n}$  brojectiles

9015	4426	404F	3422	M424	4509F1	X4736	XM650E4 (Laurch- Burn-out)	Xv75] (Launch- Burn-out)	× 711
1			4.63		5.4%			*	5.15
	1	2.42	1.58	1	2.44		1.01		
		C.54F	0.63	1	0.338		0.452	*	0.473
		2.85	3.17	3.21	3.60	3.4)	3.76/3.60	3.67,3.61	3.37
		1	0.065		0.675		5.064		
1.018									
					11.7		20.0		
0.841		0.82/	1.00		0.905	0.884			0.878
7.990			7.994		(0.2031)		(0.2029)	(0.2030)	7.990
1913.	1804.	1745.	1729.	1517. (0.4732)	1931.	2116 (0.6137)	1921./1849. 1933./1858. (0.5622/0.5411) 0.5648/C.5438)	1937./1858.  0.5648/C.5438)	1897. (0.5522)
14500.	14450.	13310.	11880.	11700.	16020. (4.568)	(5.12")	15320,714594.	16000./15281	16750.
300.0	199.0	100.0	240.0	243.2	20.5.0	256.7	200.0/187.6 (389.6/634.4)	200.0/187.6 (889.6/834.4	200.3 (891.0)

\*See Fig 1 for defunitions.

Table 8

Zoning solutions - muzzle velocity (m/s),
4.2-inch mortar, M30

CHARGE (INCREMENTS)	EXTENSION	M328A1	M335A1	M329 <b>A</b> 1	M329A2 (M329A1E1)
5	No	109	110	108	NA
10	↑	145	145	144	<b> </b>
15		181	191	180	
20	1	217	217	216	
25 4/8	No	255	253	256	
25 4/8	Yes	229	230	227	
30		250	251	248	
35		273	274	271	
41	Yes	298	297	299	NA NA
c	NA	NA	ИA	NA	96.9
5	<b>1</b>		1	个	140.6
10					178.5
15					213.6
20					241.3
25					268.5
30	↓				294.4
34	NA	NA	NA	NA	314.9
<u> </u>				<u> </u>	

<sup>\*</sup>M329A2 uses a different set than the others. Not all increments are shown for both sets.

Table 9

1

noity (m/s) 105 mm Howitzers

\*

M548E1 S S S 8 8 8 8 8 183 195 203 230 245 256 290 308 326 402 429 457 515 549 579 1 1 S<sub>N</sub> M314A2E1 Addendum M60 WP 197 208 209 218 232 232 177 187 247 263 272 286 309 321 292 374 389 439 468 483 Zoning solutions - muzzle velocity (m/s), we want M444 XM710 M84 (A11) M60 SMOKE M6C GAS Addendum 212 223 224 233 247 262 278 287 걸 195 205 204 247 302 325 337 393 393 408 465 494 60€ WEAPON/SHELL M101A1/A2 M102 MIOLAL/A2 MIO2 M101A1/32 M102 MIOIA1/A2 WIOLAL/R2 MICIAL/A2 KIGJA1/AC M167 Charge M102 XM204 M102 XM264 XM204 X:1204 XM204 XN204 Mic2 XM2C4 No No XM204 M102 (XM200) CHARGE 1 (M67) (HE 1) 3 (K67) 4 (M67) 5 (M67) (M67) 6 (M67) N **!**~ \*

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Table 10 Zoning solutions-muzzle velocity (m/s), 155mm systems

CHARCE   WEAPON/SHELL   M107   M110   M449E1,E2   XM708E1,E3   XM549   M183A1   XM718   XM549						1								
M109A1   213.6   213.3   213.4	CHARGE	WEAPON/SHELL	M107	MI10 GAS	M1 10 WP	M44951,62	XM70851, E3	XM549	M 183A1	XM718 /741	хм692 /731	M485E1, E2	XM687	XM454
M109A1 223.2 213.4 213.4 M109A1 235.2 236.2 M109A1 267.7 259.1 254.3 M109A1 277.4 288.4 280.5 M109A1 375.0 368.9 M109A1 375.0 M109A1 375.0 M109A1 465.5 M109A1 46	1G (#3A1)	M109 M109A1	207.3			228.8			197.6 201.8			212 215	ON.	
H109 H109A1/ XM198 H109 H109 275.8 H109 H109 275.8 H109A1/ XM198 H109A1/ M109A1/ M109A	1 (XM164)	M109A1 XM19R	223.2		1	213.4			207.3			228	o N	310.9
M109A1/ 267.7 259.1 274.3 M109A1/ 277.4 280.5 M109A1 315.0 M109A1/ 375.0 317.0 M109A1/ 375.0 317.0 M109A1/ 465.5 M	2G (M3A1)	M109 M109A1	236.2			236.2			223.4			242	ź	
M109A1 275.8 274.3 275.9	, (xm164)	M109A1/ XM198	267.7			259.1			253.0			274	O N	374.9
M109A1 288.4 280.5 M109 M109A1 318.5 M109A1 375.0 317.0 M109A1 374.9 M109A1 370.3 M109A1 465.5 M109A1 465.5 M109A 460.4	3G (мза1)	M109 M109A1	275.8			274.3			263.1			283	264.9 266.5	
M109A1/ 375.0 317.0 315.5 317.0 M109A1/ 375.0 374.9 M109A1/ 465.5 M109A1	3 (XM164)	M1.09a1 XM198	288.4			280.5			270.1			295	275.8	550.6
M109A1/ 375.0 369.9 374.9 370.3 M109A1/ 465.5 460.4 460.4	4G (M3A1)	M109 M109A1	317 0			315.5			303.9			325	309.8 311.3	
M109A1 374.9 370.3 370.3 M109A1 465.5 460.4	4 (XM164)	M109A1/ XM198	375.0			369.9			354.2			383	364.2	
M109A1/ 465.5 460.4	5G (M3A1)	M109 M109A1	374.9			370.3			358.6			385	368.3	
	F (XM164)	M109A1/ XM198	465.5			460.4						475	454.8	

\*XM72 Charge

Table 10 (contd)

<del></del>										
XM454	NOL VPPLICABLE									
XM687	274.6	316.4 339.3	374.2 394.0	459.8	598.7	558.5	675.4	No 692.6	NO	
M485E1,E2	274. 297.	320.	379. 399.	471.	619.	574. 577.	704.	No 696.	No	
XM692 /731	<del>一</del> 木								1	
XM718 /741										
M483A1	269.5	309.0	365.3	447.5	591.3	542.3	667.5	No 668.	801.6	
XM549										
XM708E2,E3										
M449El, E2	266.7 289.6	312.4	370.3 390.1	461.8	603.7	560.8 571.0	684.5	No 675.	826.0	
M110			Ī			Î				
M110 GAS										
M107	269.7	313.9 336.8	373.4	451.8	8.609	562.4	692.1	No 684.3	ž	
WEAPON/SHELL	M109 M109/1	M109 M105A1	M109 M109A1	M139 M109A1	M109A1 XM198	M109 M109A1	M109A1/ XM198	M109A1	M109A1/ XM198	
CHARGE	3W (M4A2)	4W (M4A2)	54 (M4A2)	67 (H482)	6 (XM201E2)	7W (MAR2)	7 (XM201E2)	8 (4119)	8 (XM203E2)	

Table 11

Zoning solution, muzzle velocities, 175mm system (self-propelled gun, M107, projectile M437A1, A2)

CHARGE	MUZZLE VELOCITY (m/s)
1G (XM124)	510.5
lW (M86Al, A2)	510.5
2W (M86Al, A2)	704.1
3W (M86Al, A2)	914.4

Table 12

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Zoning solutions, muzzle velocity (m/s), 8-inch systems

1	A A	AA	AA	TA A.	A A .	- A - A	T	<del></del>	A A	7
XM753										
XM7.1.1										
XM650E4	247.	270. 268.	299. 299.	341. 345.	405.	424. 442.	497.	588. 602.	No Addendum	No Addendum
(M422/424)	254.5 260.	359.7 366.	547.1 552.							
XM736										
M509E1	240.6	265. 5 254.	295.4	328.7 341.	407.3	416.8 439.	492.0	581.0 591.	No 694.	No 755.
M404	249.9	274.3 280.	304.8	349.3 353.	418.2	418.2 448.	497.1 522.	591.3 60 <b>4</b> .	No 707.	Nc 768.
M10-5	249.9	274.3	304.8	350.5 354.0	420.6	420.6	499,9	594.4 607.0	No 710.4	No 771.3
WEAPON/SHELL	M110 M110E2	M110 M11052	M110 M11052	M110 M110E2	M110 M110E2	M110 M110E2	M110 M110E2	M110 M110E2	M110 M110E2	M110 M110E2
CHARGE	1 (M1)	2 (M1)	3 (M1)	4 (M1)	5 (M1)	5 (M2)	6 (M2)	7 (M2)	8 (XM188E2)	9 (XM188E2)

\* Propelling charge M80

A Charge is usually also identified by a one or two character alphanumeric code for ease of referencing (firing tables, etc.). Quite often there is more than one type of propellant (the difference can be in either composition or shape or both) used in the same weapon system. These types have an official designation also. For example, the 155mm M109A1 Howitzer currently uses three such propellant types designated as: M3A1, M4A4, and M119. There are five different amounts of the M3A1 propellant used and identified as Charges 1G through 5G; five different amounts of the M4A2 propellant identified as Charges 3W to 7W; and the M119 propellant has one charge, Charge 8.

A zoning solution for a weapon system has as its main goal the assurance of a range over-lap between the zones of adjacent charges or, at the very least, the avoidance of a gap. Quite often practical aeroballistics will also affect these solutions since all shell have some Mach number and quadrant elevation regions where they exhibit lower performance than over most other regions. A judicious selection of launch velocities can often help alleviate the effect of such flight regimes and therefore decrease dispersion and increase effective range.

It can be seen that a zoning solution consists of a set of muzzle velocities which, in turn, determines the charge (type and amount) for a specific weapon and projectile.

These zoning solutions have been tabulated for US weapon systems from the 4.2 inch Mortar to the 8-inch Howitzers in Tables 8 to 12. These are based on References 3 to 17 and data provided by Firing Tables Branch, BRL; Yuma Proving Ground; numerous sections of the Ammunition Development and Engineering Division, Picatinny Arsenal, and Edgewood Arsenal. Note that the 4.2 inch Mortar differs from regular artillery weapons in having only three quadrant elevations and many muzzle velocities (charge increments). Thus, Table 8 has only selected charge increments. If a complete tabulation is needed, they can be found in References 3 and 4. The zoning solutions that are available for Soviet weapon systems are in Table 3A in the classified addendum to this report and so is classified data on US projectiles.

Rocket assisted projectiles (RAPs) require more than their launch velocity to be specified in order to predict their range and, hence, their zones. Therefore, the necessary remaining information beyond that in the inertial properties tables for before and after burning and the aero-dynamic coefficients in Appendix B are presented here in Table 13 for US RAPs (insufficient data is available on Soviet RAPs).

Table 13 . Rocket assisted projectile thrust data

Projectile	Delay time <sup>a</sup> (sec)	Burn time (sec)	Thrust (lb)	Drag form factor (during burning)
M 548	14.	2.3	92.5	1.00
M 549	7.	2.5	558.0	1.00
XM650E4	7.	3.0	786.5	0.96
XM753	7.	3.0	786.5	0.96

 $<sup>^{\</sup>rm a}$ Time from launch to motor ignition

Zoning information for the XM712 is also available from the trajectory data in that section of this report and in the zoning section of the Addendum.

# Dispersion

The US Army has standardized upon the probable error as the measure of dispersion. Range and deflection dispersion are treated as separate one-dimensional problems. Since a probable error in range or deflection is defined as the distance on both sides of the mean point of impact (MPI) which together will include (in a statistical sense) 50% of the rounds fired, a one-dimensional probable error is 0.6745 of the unbiased standard deviation.

These probable errors, range and deflection, are tabulated in References 3 to 17 in their supplementary data tables. They are also shown in the probable error columns in the compacted firing tables in Appendix A of this report.

"Firing table" values are usually the smallest measure of dispersion. Various other measures of dispersion are thoroughly discussed in Reference 1 and the pertinent excerpt is included here verbatim. The only changes have been to include some curves of the "firing table" values (these are labeled "precision" since they conform to that definition in Reference 1) on their graphs and to adjust figure and reference nomenclature.

"One of the most confusing field artillery performance characteristics is the delivery accuracy. Table 14 lists both the precision and MPI probable errors for conventional and extended range projectiles. Precision is the scatter of burst points about the mean point of impact (MPI) of a group of rounds fired from a single weapon on a single occasion from a single site. The MPI is the mean range and mean deflection of a set of impact points. If the rounds are fuzed for air bursts, the mean burst height is also included. The MPI is not necessarily the aimpoint or target. The probable error in precision is usually expressed in metera (m) measured from the MPI If, for example, at a certain range 50 percent of the projectiles fall between the mean range plus 10 m and the mean range minus 10 m, the precision probable error in range is 10 m at that specified range. The listed precision errors are given in units of percent range (range at which measurement is valid) and

mils deflection. The values given are average values that may occur between 75 percent of maximum weapon range and maximum range at the top charge. For instance, Table 14 lists 0.21 percent range and 0.65 mils as the precision error for the M101A1 howitzer firing conventional munitions; therefore, the precision probable error in range at maximum range (11.0 km) is 23.1 m and the precision probable error in deflection at the same range is 7.0 m. At 75 percent maximum range (8250 m), the precision probable range and deflection corors are 17.3 and 5.3 m, respectively. The listed precision data are not applicable to ranges less than 75 percent maximum weapon range (precision error vs range is nonlinear) or to charges (zones) other than top charges.

To describe a more realistic delivery accuracy, the mean point of impact (MPI) error is used. The MPI error is defined as the scatter of MPIs about an aimpoint. The aimpoint is not necessarily the target, there may be an unknown target location error. Precision errors are caused primarily by inherent errors in a single weapon and ammunition system, but MPI errors are caused by system errors such as imperfect aiming procedures and erroneous meteorological predictions. In a fire mission adjusted by a forward observer, the primary source of MPI error will be the forward observer's adjustment and location inaccuracies. In the Met + VE predicted fire mission, however, the MPI error will be caused by meteorological errors (Met) and velocity errors (VE) such as tube-totube differences (in a battery) and registration errors (a registration is never truly accurate, but it is assumed to be so; therefore, there is a constant residual error for each registration). The largest mereorological error results from the inability to satisfactorily predict wind velocity and direction. This ballistic wind error may be 150 percent larger than any other single met error. Available Met + MP! probable errors are given in Table 14 in units of percent range and mils deflection. As before, these are average values that may occur between 75 percent of maximum weapon range and maximum range at top charge.

Figures 2 through 7 graphically describe the range and deflection MPI probable error (in metres) as a function of range for selected weapons firing Met + VE missions. In

Table 14

Field artillery cannon-type weapon systems

	Precision pr Range/D	Precision probable error Range/Deflection	MFI probable error Range/Deflection	le error ection	Cannon
Weapon system	Conventional	Extended range	Conventional	Extended range Conventional Extended range	designation
M101A1	0.21/0.65		0.93/3.45		M2A.1/A2
M102	6.16/0.27				M137A1
XM204	0.25/1.00	0.25/1.00*			XM295
M108	0,16/0,27				M103
M114A1	0.37/0.32				141/41
Xi4198	0.30/1.60				XM199
M109	0.29/0.39	0.29/0.62	0.73/3.39	0.75/2.75	M126/A1
M109A.1	03.33/0.60		0.74/3.37		M185
M110	6.30/0.20		0.72/3.33		M2A2
M110E2	0.25/1.00	6.25/1.00*			XM201
701N	0.28/0.57		0.71/3.62		M113/A1

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<sup>\*</sup>as per material need requirement

most illustrations several zones are represented and identified by; for example, I (Charge 1), II (Charge 2), and IIIw (Charge 3, white bag). Several features of this series of figures are outstanding. First, although low charges are designed for short-range operation, at certain ranges the low-charge error is nearly double that of the top zone at the same range. A principal cause of this phenomenon is projectile instability due to slower launch velocities. Cannon life expectancy is advantageously extended, howeven, when lower charges are used. Figures 3 and 4 show that the M109 firing the M549 RA projectile has a smaller MPI range error than the M109 firing the M107 HE projectile at ranges above 8 km with Charge 7. At 12 km, the M109/ M549 RA has an MPI range probable error at 74 m; the M109/M107 HE, 90 m. These values seem illogically reversed. One possible reason for this unexpected result may be that the RAP is less sensitive to ballistic winds because of the inherent in-flight propulsion and improved aerodynamics. Figure 7, the MPI probable error of the M107 175mm gun, shows the error magnitude that may be expected for 30-km systems: range probable error, 20m; deflection probable error, 110 m. This is not the end of the delivery accuracy story, however, as best shown by the Helbat I tests (Ref 20) where simulated operational readiness tests produced some errors greatly in excess of those given by the MPI curves: for an M103 howitzer firing to an average range of 9.0 km, graphical range probable error was 135 m and deflection probable error was 86 m. The MPI prohable errors for the same range and zone are as follows: range probable error, 85 m; deflection probable error, 23 m. Since the Helbat ranges varied from 8 to 12 km and since all Helbat missions were not strictly Met + VE types, a direct comparison of the Helbat I data with the MPI error curves may be questionable: but the effect of human error obviously should not be ignored". . .

Further discussion of this topic may be found in Reference 21.

For any case in Appendix A where the source is not a firing table and probable errors are given, they are either from a limited number of firings or estimated from computer simulations. These values should be considered as estimates only. It is worthwhile to repeat the warning in

the discussion from Reference 1 about the dominant effect of meteorological error, primarily winds at altitudes, upon precision and the importance of target location error upon actual miss distances.

The only guided projectile considered in this study is the XM712 (Cannon Launched Guided Projectile (CLGP). The discussion of its accuracy is given in the classified Addendum of this report. Dispersion data on Soviet munitions which is available is also included in the classified Addendum to this report.

## Aerodynamic Coefficients

All of the aerodynamic coefficients presented in this report, except for the XM712 (CLGP), were estimated by the same method and are presented in the same format. The method—used is documented in Reference 22 and is available as a computer program, SPIN73, in FORTRAN. It consists, basically, of empirical curve fits to a large data base of the effect of various projectile dimensions upon the aerodynamic coefficients (Ref 22).

The estimates generated by SPIN73 are given in Appendix B, except for the data on Soviet ammunition which is in the classified Addendum. Some discussion of the meaning of the various column headings is necessary to understand how to use the output in standard aerodynamic coefficient form.

If we call the total angle of attack  $\alpha$  (radians), the spin p (radians/sec), and the angular rates are pitch,  $\alpha$ , or yaw, r (both rad/sec), then the various coefficients are, in terms of the SPIN73 tabulated names, as a function of Mach number:

Axial Force: 
$$C_X(M,\alpha) = CX + CX2 \sin^2 \alpha$$
 (1)

Normal Force: 
$$C_N(M,\alpha) = CNA \sin \alpha$$
 (2)

Pitching Moment: 
$$C_{m}(M,\alpha,q) = CMA \sin\alpha + (qd/2V)CMQ$$
 (3)

Magnus Force\*: 
$$C'_{y}(M,\alpha,p) = (pd/2V)CYPA \sin\alpha$$
 (4)

Magnus Moment\*: 
$$C'_n(M,\alpha,p) = (pd/2V) (CNPA \sin\alpha + (5)$$

CNPA3 
$$\sin^3 \alpha + \text{CNFA5 } \sin^5 \alpha$$
)

Rolling Moment: 
$$C_{g}(M,p) = (pd/2V) CLP$$
 (6)

<sup>\*</sup>Primes indicate that this is only the Magnus contribution to the side force,  $C_y$  and the side moment,  $C_n$ .

where all tabulated coefficients are functions of Machini inher (M), d is the reference diameter, and V is the flight velocity.

In addition to the above, the following are also tabulated: the normal force center of pressure, CPN (in calibers from the nose), the Magnus force center of pressure at 1° and 5° angle of attack, CPF [1] and CPF [5] (from the nose) and the secant slope of the Magnus moment (per radian) at 5° angle of attack, CNPA [5]. Note that the designation, dimensions, and physical properties of the projectiles are included in the description above the coefficient tables.

The SPIN73 generated coefficients have not been checked for a trajectory match with firing tables, where available, because of the lack of time; therefore, they have not been perturbed to produce such a match. Based on past experience and the degree of coefficient match reported in Reference 22, it is expected that the mismatch is not severe for projectile configurations within the range of the data base.

The XM712 (CLGP) coefficients are presented in whatever form that they were available in the references. Usually derivatives with respect to angle of attack given in this data will be per radian rather than in terms of sin  $\alpha$ . The Advanced Development (AD) configuration had only a folding deflectable cruciform tail and is reported in Reference 23. The Engineering Development configuration added a cruciform set of fixed (in deflection) folding wings and this is reported in Reference 24. Edited excerpts taken from these sources are presented in Appendixes C-1 and C-2.

#### Trajectories and Firing Tables

Complete computer simulated trajectories based on the aerodynamic coefficients in Appendix B and the inertial properties discussed earlier are not available. At the time the termination of this task due to reprogramming of funds became known, it was decided that a thorough job of generating aerodynamic coefficients and collecting inertial properties on the projectiles was necessary, since it would be impossible to compute trajectories at a later date without this data.

Substantial trajectory data are available in this report. The compacted firing tables of Appendix A have range, deflection (angular), and quadrant elevation information. Most of this is from firing tables (Ref 3-17) while some is from computer simulated trajectories available for projectiles in development under other projects or from a limited number of firings. It

is not claimed that this data can be exactly duplicated using the aerodynamic, inertial, and initial conditions data in this report. Based on past experience with SPIN73 aerodynamic coefficients, the results should be in fairly good agreement. Not only is it possible to refer to References 3 to 17 for finer detail in range than is in the compacted tables of Appendix A but these references contain other information that is not in the compacted tables. Probably the most useful of this additional information is time of flight, angle of fall, terminal velocity, and graphs of altitude versus range. However, this data is only available for projectiles which have final or provisional firing tables.

The range data on the XM712 CLGP available in Reference 24 is included in the Fly Under-Fly Out (FUFO) capability (Fig 8-15). This is purely analytical data. More information is available in the Addendum under zoning.

Similar compacted firing tables for those Soviet shell for which full tables are available have been generated and are in the Addendum to this report.

## Control Aeroballistics

The subject of this section is the experimental and analytical investigation of the aerodynamics of projectiles guided by aerodynamic surfaces. The primary method of presenting the information will be bibliographies of experimental and analytical methods. There is, of course, some overlap. Analytical reports will usually contain experimental comparisons and experimental reports will often discuss and compare various theories with the data.

There has been some aerodynamic coefficient data on the XM712 Cannon Launched Guided Projectile collected and presented in Appendixes C-1 (AD) and C-2 (ED). They represent both its AD (tail alone) and its ED (tail and wings) configurations and were taken from Control Aerodynamics Experimental Bibliography items CE1 and CE7. Data on a canard controlled-fixed tail CLGP design that was not selected for Engineering Development is available in Experimental Bibliography items CE14, CE15, and CE19.

The bibliographies are not meant to be exhaustive or deal with basic aerodynamics. Hopefully the most recent and/or applicable work on aerodynamic controlled and guided projectiles have been included. It should

be noted that many of the items listed are titles obtained from a computer search and have not yet been obtained for a more complete study of their applicability.

The analytical methods that could be studied exhibit some areas of poor agreement with experimental results. They also usually do not allow for more than two surfaces at a particular body station. Multiple surface capability is needed for all foreseeable artillery rounds. A typical difficulty with the vortex shedding approach, so widely used, is that for in-line surfaces (e.g., wing-tail, canard-tail or canard-wing) the vortex shed by the forward surface may be predicted to pass above (under) the rearward surface while experiment shows it passes under (above) the surface (see discussion in CA10). Other experimental results indicate difficulty in predicting cross-coupling and roll (spin) effects in general and also static stability in the transonic velocity flight regime.

As part of another task, preliminary and final aero data package experimental programs were suggested for the two configurations proposed for the CLGP ED program. These experimental efforts were intended to investigate the expected trouble areas in both cases without incurring excessive program costs; a research program would be more extensive. These programs are attached as Appendixes D-1 and D-2. Appendix D-1 applies to a canard-controlled fixed-tail configuration and Appendix D-2 applies to a fixed-wing tail-controlled configuration.

Analytical studies should be pursued to improve techniques especially for in-line surfaces, transonic flight, multiple surfaces; and pitch, yaw, and roll coupling.

#### Terminal Ballistics

## Lethality and Vulnerability

The lethality and vulnerability aspects of terminal ballistics was intended to be dealt with by a selected bibliography from the basic source, Reference 25. The fact that the selection must be based upon the descriptions in Reference 25 rather than upon actual study of the possible selections is unforturate.

The descriptions in Reference 25 are sufficiently clear so that the bibliography for this section includes the most useful material currently available. Vulnerability of target systems has been included as an aspect of lethality.

# Sensitivity Coefficients

Sensitivity coefficients are, in general, first partial derivatives. For example, holding all other variables constant, the effect of projectile weight on range is linearized as  $\Delta R = (\frac{\partial R}{\partial W}) \Delta W$ , where  $\frac{\partial R}{\partial W}$  is the sensitivity coefficient for range with respect to weight.

The practice of the US Army is to include such corrections in their firing tables for muzzle velocity, cross wind, range wind, air temperature, air density, and projectile weight. Propellant temperature corrections are also made indirectly. There is usually a separate table which gives the change in muzzle velocity for a given propellant temperature; this is then used as a muzzle velocity correction to range.

The only listed correction which is not a true partial derivative is the one for projectile weight. This range correction includes both the effect of changed muzzle velocity and the effect of changed ballistic coefficient, (W/CxA), during flight. This is why a separate correction for muzzle velocity should not be made for a weight variation. The muzzle velocity correction is to be used for propellant temperature corrections, as mentioned, and for other effects, such as bore wear.

Firing table corrections may appear to be backwards but this is not so. An increase in muzzle velocity will, for example, increase range; that is,  $\frac{\partial R}{\partial V} > 0$ . But when one looks at a firing table it will be seen that for a muzzle velocity increase (usually tabulated for 1 m/s) the range correction is given as a negative number, a decrease. This is because the tabulated range change is to be algebraically added to the range desired, producing in this case a shorter range. This will require that the gun elevation be set so as to produce this shorter range. Then, when the shell really flies further because of the increase in muzzle velocity, the desired range will be reached. Similar reasoning applies to all the other corrections and is the only real difference between corrections and sensitivity coefficients. (A tail range wind is considered an increase and azimuth corrections for a cross wind are made into the wind.)

Most US Army firing tables give ranges and range corrections in meters and elevations and azimuths and their corrections in mils. One Army mil is defined as 1/6400 of a circle. The usual increments in the independent variables used are: cross and range winds: 1 knot, muzzle velocity: 1 m/s, air temperature: 1% of standard (518.7°R, 288.15°K), air

density: 1% of standard (0.002378 slug/ft³, 1.2250 kg/m³), and projectile weight: usually 1 square (SQ) from a stated standard, e.g., 2 SQ STD. Atomic rounds are marked with their actual numerical weight so their firing table corrections are given per pound.

A further explanation of weight squares follows. Artillery projectiles are stamped with square-shaped marks to give an indication of how far away the loaded projectile is from some reference weight. The value of a square is different in terms of pounds from one projectile to another. The approximate values for some projectiles are listed below (Table 15) so that a conversion can be made between squares and pounds. Another point to be kept in mind is that a particular firing table may use a non-zero number of squares as the reference weight of a projectile (the one for which the basic table has been constructed). This is always given but note must be taken. For example: a projectile is stamped with 4 squares but the standard number of squares is given as 2. Therefore, the range correction to be made is that for + 2 squares not that for + 4 squares.

The compacted firing tables presented for US projectiles in Appendix A contain all the corrections mentioned above where they are available. The data on those projectiles which have official firing tables or provisional firing tables are usually complete. Whatever data was available from other projects has been incorporated into Appendix A. Most of the data, especially on projectiles in development, is based on computer simulations but a limited amount of firing data is also available and has been included. Appendix A is no exception to all the data in this report; whenever a projectile datum has been extrapolated unduly or assumed the same as some other projectile, that value is inclosed in parentheses.

Similar compacted firing tables for those Soviet projectiles for which the information exists are presented in the Addendum to this report.

Table 15
Approximate relationship between squares and weight

Projectile	Standard squares	Pounds/square	Source
M329A1	2	0.25	Ref 3
M328A1	2 (= 7 of M329A1)	0.30	Ref 3
M1	2	0.6	Ref 5
M60, Gas	2	0.6	Ref 5
M60, WP	5	1.0	Ref 5
M 548	2	0.5	Ref 6
M107	4	1.1	Ref 8
M110, Gas	4	1.1	Ref 8
M110, WP	5	1.1	Ref 8
M116	4	1.1	Ref 8
M116, Colorec	i (= 4 of M1)		Ref 8
M121, A1	8	1.1	Ref 8
M 549	4	1.4	Ref 13
M437A1, A2	3	1.1	Ref 14
M106	4	2.5	Ref 15
M404	4	2.5	Ref 17

#### CONCLUSIONS AND RECOMMENDATIONS

The most up-to-date unclassified aeroballistic data available on US Army indirect-fire projectiles (105mm and up) has been collected or generated. Aeroballistic is used in a very broad sense to include: external dimensions, inertial properties, trajectories, zoning, dispersion, sensitivity coefficients, aerodynamic coefficients, lethality and vulnerability, and controlled projectile aerodynamics.

Classified data in the above areas on US projectiles and all data on Soviet and Soviet Bloc indirect fire artillery projectiles (100mm and up) which were also collected or generated are in a separate addendum to this main report.

This study concentrated on generating a complete set of aerodynamic data without any trajectory information; the rationale being that trajectories can be run later with the data. It is not presently known how closery the aerodynamic data, when used in simulated trajectories, will match firing table results. Past experience lends credence to the belief that the match will be acceptable.

It is recommended that further work in this area should assure consistency between predicted aerodynamic coefficients and firing table results and include free-flight rocket aeroballistics.

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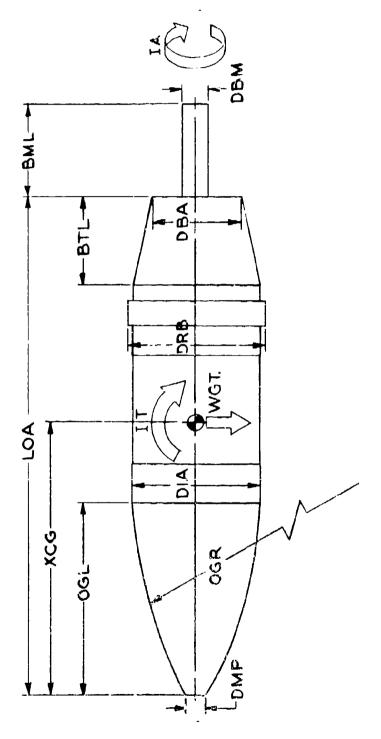
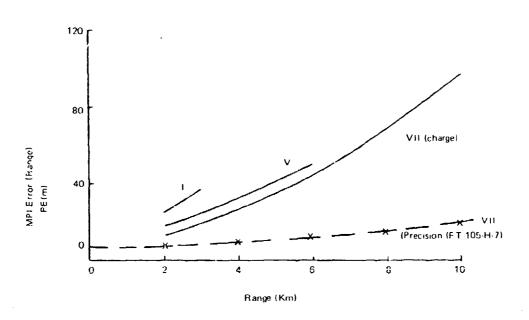


Fig 1. Definition of quantities describing projectile geometry and injertial properties

1.



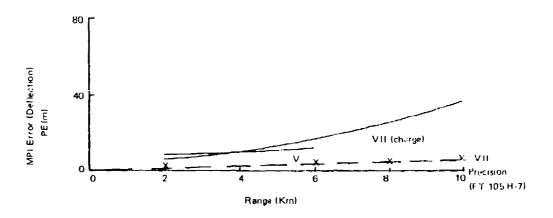


Fig 2. M101A1 (105mm) MPI probable error firing M1 HE projectile

120 | 80 | VII (charge) | VIII (charge) | VIII (charge) | VIII (charge) | VIII (Precision (FT 156-AH-3)) | VIII (Precision (FT 156-AH-3)) | VIII (Charge) | VI

\$

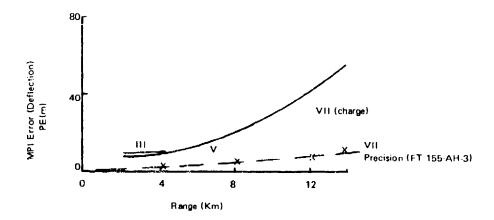
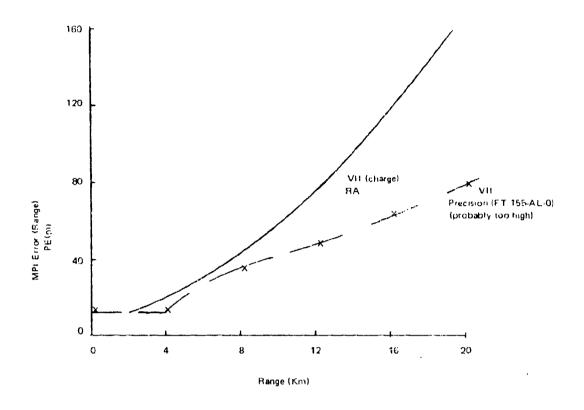


Fig 3. M109 (155mm) MPI probable error firing M107 HE projectile



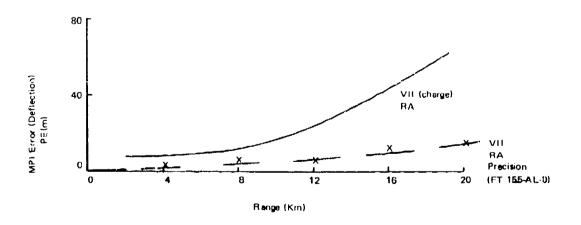
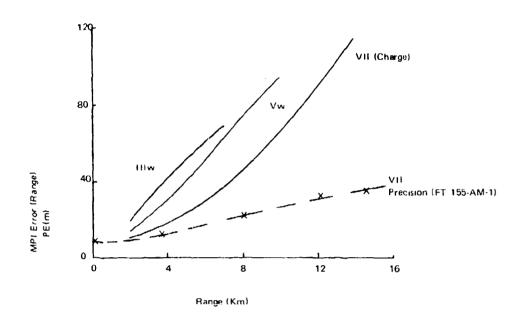


Fig 4. M109 (155mm) MPI probable error firing M549 RA projectile



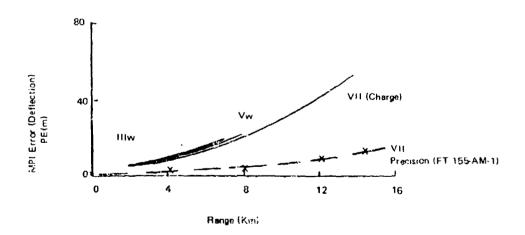


Fig 5. M109A1 (155mm) MPI probable error firing M107 HE projectile

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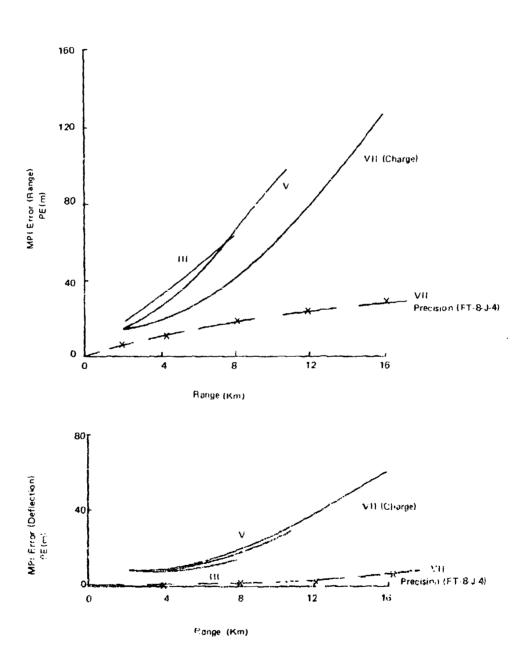
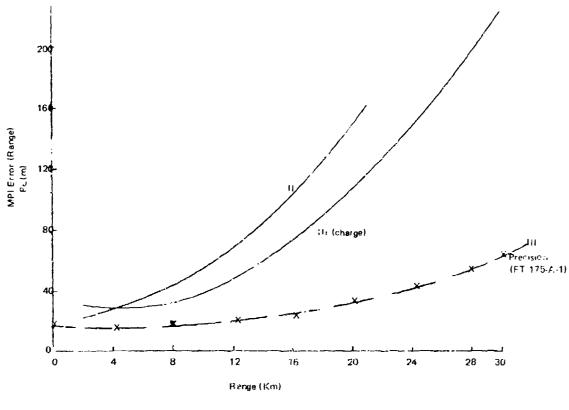
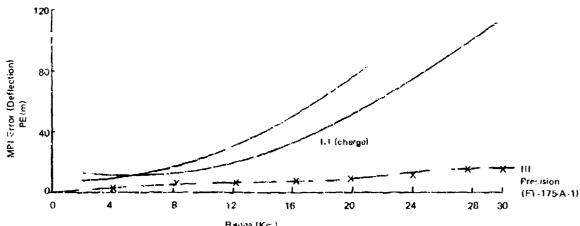


Fig 6. M110 (203mm) MPI probable error firing M106 HE projectile





 $${\rm Hange}\,(K_{\rm ff})$$  Fig. 7. M107 (175mm)  $\it MPI$  probable error firing M437E2 HE projectile

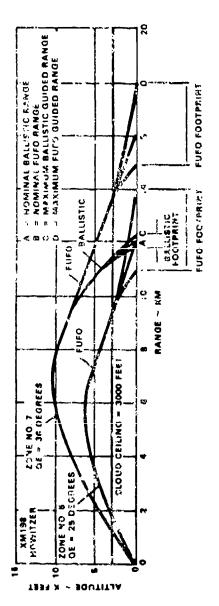


Fig 8. XM712 ballistic and FUFO trajectory option, XM193 howitzer

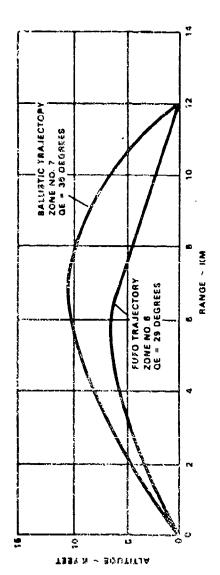


Fig 9. Shallower approach angle of FUFO compared to ballistic trajectory of same range

11 P

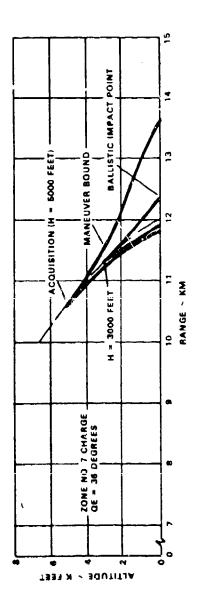


Fig 10. Ballistic trajectory maneuver bounds, 12km nominal range

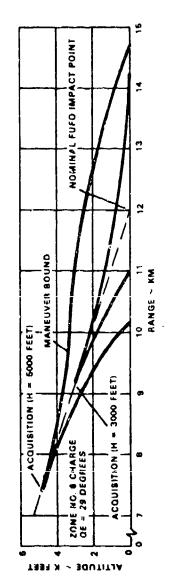


Fig 11. FUFO trajectory maneuver bounds, 12km nominal range

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AND THE PROPERTY OF THE PROPER

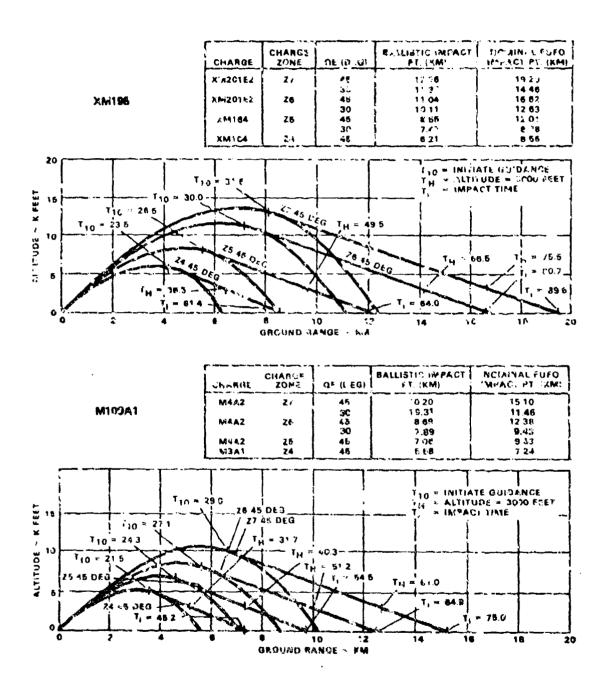


Fig 12. FUFO range extension for XM198 how!tzer



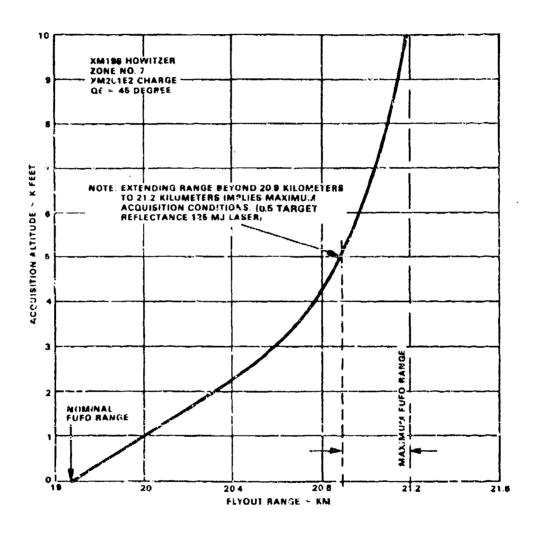


Fig 13. Maximum FUi O guided range, XM198 howitzer

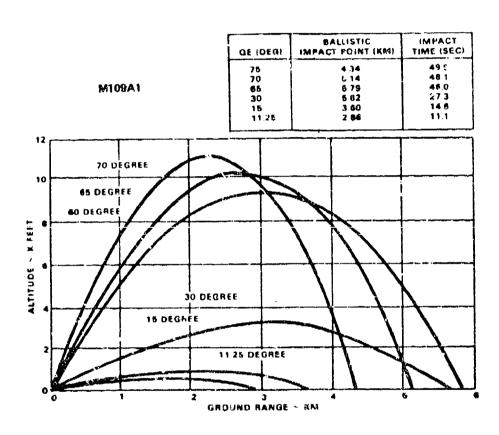


Fig 14. Minimum range trajectories with M109A1 howitzer, charge 4

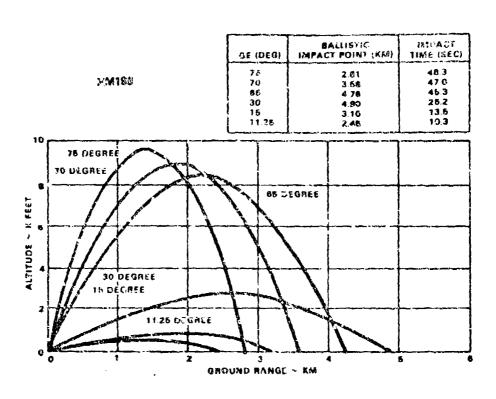


Fig 15. Minimum range trajectories with XM198 howitzer, charge 4

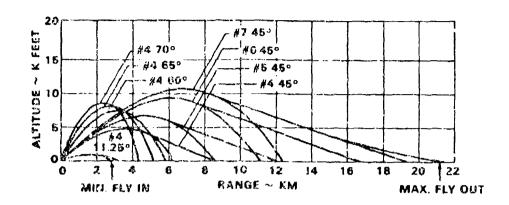


Fig 16. Trajectory flexibility due to FUFO and high/low QE options

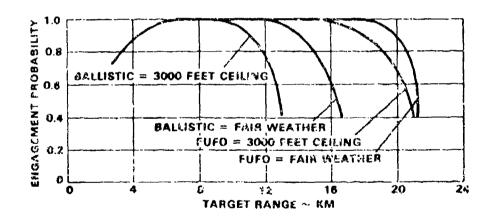


Fig 17. Engagement probability, ballistic and FUFO

## APPENDIX A COMPACTED FIRING TABLES OR SIMULATIONS

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Table A-1 M36 mortar, 3.2-inch, firing M329A1

		BASIC	Basic Frojectile: "13,941, 1,76 4557	9412 Fre 45			1	Elpert	5172 008 10011 me13	ا د د						1
	Sour	Source: 774.2-1-2	57,				l		also numerally has for Shells	KT 100.	en for		H32841			
Ba	Basic	Charge Corr.	Azımuth Cerrections	rections				Range.	Corrections	ns (meters)	(8.3				Prob. E	Ericre
change	Runge	1/8 :nc.	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity i meter/sec	elocity ir/sec	Range-Kund I knot	59-810d knot	Air Tempo	Temperature 11	Air Sensity	nsity	Proj. W.	of 12g S*d.	SAFOR	Setil.
i ac	36:00	heters	STE	:118	å	٠. ١	Head	[387]	Dec	3.1.1	الح.	1 E	3	Inc	weters.	Secors
TUCET IN	WITHOUT EXTENSION															
.~	1020	¢۱	1.14	·	18.2	-17.7	1.2	3.0-	0.0	0.0	0.1	=	1;	1	c	-
7	1430	81	36.0	۴.5	20.5	9.41-	1.8	-1:	ა.0	0 0	5 [-	2:5	ά	50	1.2	2
2	15:0	ō.	74.1	Ę.,	21.9	-21.2	2.4	-1.7	0.0	0.0	-2.b	5.6	ئ	J-	4	-,
2,7	2200	υ.:	33.8	, . · · ·	22.9	-22.4	1.2	-2.3	0.0	0.0	-3.5	3.5	6-	2	11	'n
1.5	3,620	:4	34.4	6.0	23.7	-23.3	0.7	-3.0	0.0	0.0	-5.2	5.3	0;-	10	20	7
ş. 1	30.50	2.5	35.4	9.0	24.2	-23.9	8.7	-3.3	0.0	0.0	-4.8	53	-11	11	23	٠,٥
20	3440	22	36.7	σ. Ξ	24.5	9 9 1	5.8	7	0.0	0.0	-8.5	9.1	-11	1.2	; ;	9
::	4920	22	38.3	ŷ. ĉ	24.7	-24.7	6.9	-5. !	0.0	0.0	-11.3	11.8	-13	14	×	7
254	4389	7.7	39.7	0	24.8	8.42-	6.4	)-9-	0.3	0.0	-13.2	-13.7	-15	1.5	32	æ
254 254	5.54.38 3830	1.5	27.6	8.0	25.5	-25.4	6.1	-4.	0.0	0.0	9.6-	10.1	7.1	51	23	5
28	4170	115	78.4	ò.(·	25.6	-25.5		,-	ი.ი	0.0		11.6	- <del>1</del> -	#:	:7	2
30	7360	15	23.9	p. (2	25.7	-25.6	7.3	3'5-	0.0	0.0	-12.4	.2.9	-14	15	23	٧.
32%	3,660	15	39.6	9.0	25.7	-25.?	1.8	119-	0.0	0.0	6.6:-	14.5	- 14	.1	28	۰
33	ÿ967	1.5	30.3	6°C	25.5	-25.7	1.6	9-	7.0	0.0	-15.6	16.2	-13	7.	30	æ
3.9	53:0	1.5	31.0	6.1	8.47	-25.4	10.6	2-	1.6	-0.4	-17.6	18.4	-13	13	32	
.,	5250		317	0.1	23.5	-24.5	12.3	372-	3.7	-:	-19.7	20.7	0:-	11	17	1~
SARPA-P	SARPA-PR (32) 2/66 Dec	768 Dec 75	T													

57

Table A-1 (continued)

		BAS1C F	Projectile: 33	332941. (42P MSS7	557			Elesar	Elezation: 900 mils	o atls						
	Sou	Source; <u>£14,2-11-2</u>					i		Also Curi	Also Currently Used for Shell:	to for	Shell:	M328A1		ļ	ı
Ea:	Basic	Charge Corr.	Azimuth Corrections	rect 10ns				Penge	Corrections	ons (meters)	rs)				Prob. E	Errors
Charge	Range	1/8 Inc.	Drift Corr. to Left	Cross-Wind	Muzzle Velocity I meter/sec	elocity r/sec	Range-Wind I knot	1411.3 lot	Alr Tempe	Temperature 14	Air De	Density 11	Proj. Wt. 2 Sq	of 1 So Std.	Range	Def1.
2017	meters	meters	m11s	B118	ĕ	Inc	Head	Tail	ĕ	-Tnc	ğ	Inc	S S	Inc	meters	meters
WITHOUT	WITHOUT EXTENSION	25.7														
۰,۰	1060	16	35.4	9.6	19.5	-17.4	1.3	ر د . غ	0.2	0.0	6.0-	0.1	1 ';	7	6	1
۲,	1400	18	33.0	0.7	20.2	-19.3	1.8		0.0	0.0	-1.6	1.5	œ	80	=	2
10	1770	19	33.4	0.7	21.5	-20.8	2.5	7	0.0	9.0	-2.5	2.6	٩	6	14	2
<b>۱</b> ۲۶	2140	07	35.2	80	22.0	-22.6	3.3	-2-	0.0	0.0	-3.7	3.8		6	91	-
15	25.70	2.1	37.5	9.0	23.3	-22.9	4.2	-3.0	0.0	0.0	-5.1	5.2	-10	οĩ	50	-3
ξ.	3000	21	41.1	9.6	23.9	-23.6	5.2	-3.7	0.0	0.0	-6.7	6.9	-10	11	23	5
20	34.10	20	42.7	1.0	24.2	-24.0	6.0	-4.5	0.0	0.0	-8.5	8.9	-11	12	26	9
7.3	3950	23	6.54	1.0	24.5	-24.4	7.2	-5.:	0.0	0.0	-11.1	11.6	-13	14	59	1~
25.5	7390	22	7.87	1.1	24.5	-24.5	5.4	-6.3	0.0	0.0	-13.4	14.0	-15	16	32	8
41TH EX. 255	EXTENSION 3720	14	29.6	1.0	24.5	-24.5	6. ز	6.7-	0.0	0.0	ر. د. در	10.1	-13	14	23	5
28	4000	14	30.4	1.0	24.7	-24.6	7.2	-5.4	0.0	0.0	-11.2	11.6	-13	14	24	5
30	4230	7.7	30.9	1.0	24.8	-24.7	7.7	-5.9	0.0	0.0	-12.3	12.8	-13	14	26	5
32%	4520	14	31.7	1.1	24.8	-24 8	8.6	-6	0.0	0.0	-13.9	14.5	-13	13	23	9
35	4800	14	32.3	1.1	24.5	-24.8	9.6	-6.9	7.0	0.0	-15.5	16.2	-12	13	67	9
38	5150	38	33.1	1.1	23.9	-24.5	11.0	-7.45	1.5	-0.4	-17,5	18.3	11-	12	31	•
17	24.80	75	33.8	1.1	27.7	-23.6	12.7	<del>-</del>	3.5	-1.3	-19.5	20.6	6-	OI	33	
SARRE	SARRI-PH (UT) 2768	700 Dac 75					1	1	1							

Table A-1 (continued)

Υ,

			M329AL, fuze M557	9Al. fuze MS	5.7		ı	Elevit	Elevition: 1065 mils	5 mils						
	Sour	Source: FT4.2-9-2	1-2				l I	ε,	Also Currently Used for Shell:	ently Use	d for 3		M328A1			
															,	Γ
Basi	Basic	Charee Corr.	Azimuth Corr	Corrections				Panye (	Corrections	ns (meters)	(8)				Prob. E	Frrors
Charge	Kange	1/8 Inc.	Drift Corr. to Left	Cross-Mind 1 knot	Muzzle Velocity l meter/sec	elocity r/sec	Range-Wind 1 knot		Air Temperature 14	rature	Air De	Densit,	Pros. Wt. 2 Sq	of 15g Sed.	Range	Def1.
. 30	geters	neters	mils	F.11S	9°C	Inc	Head	7411	) N	lae	Dec	Inc	Dec	Inc	meters	meters
15	EXTENS 10															
Ŷ	920	,,	7.6.7	6.0	0.41	-15.0	1.5	6.0-	0.0	0.0	-1.0	c	, Q		80	-
۲	1220	15	6.09	6.0	17.5	-16.7	2.1	-1.1	0.0	0.0	-1.6	1.6	9	_	01	2
ءِ ا	1540	12	52.7	1.0	18.8	-18.1	8: 7	-1.9	0.0	0.0	-2.4	2.5	-7	^	~	۲,
	900	<u>a</u>	0.05	-:	6.61	-19.3	3.6	-2.5	0.0	0.0	-3.4	3.5	8-	တ	22	3
¥	0001	0	30.2	1.1	50.9	-20.4	4.4		0.0	0.0	1.4-	8.4	8-	6		3
; ;	2620	19	51.9	1.2	23.7	-21.3	5.3	3.5-	0.0	0.0	-6.1	6.3	6-	10	20	7
20	10.00	20	54.6	1.2	22.5	-22.1	6.2	-4.3	0.0	0.0	-7.5	გ.ი	-11	11	2.3	5
<u>بر</u>	3510	21	58.3	1	23.3	-23.0	7.2	-5	0.0	0.0	6.6-	10.2	-13	7.	26	۰
25%	3930	21	51.7	1.3	24.0	-23.6	8.2	1-9-	0.0	0.0	-11.5	12.3	-16	13	67	1-
WITH EX	ENTENSION 3.260		39.1	1.2	22.5	-32.2	6.8	-4.14	0.0	0.0	-8.8	9.1	-12	13	20	4
£ 5	3520	=	39.9	1.3	22.9	-22.6	7.4	. 5-	0.0	0.0	-10.1	.7.01	-12	5	17	4
9	37.30	62	40.6	1.3	23.7	-22.9	7.9	-5.3	0.0	0.0	-11.1	11.5	-13	-2	23	~
ا ا	OO'.	22	41.3	1.3	23.5	-23.2	8.6	-6.3	0.0	0.0	-12.4	12.9	·:-	-2	74	5
ا آ	4270	14	42.1	1.3	23.7	-:3.6	9.4	8.9-	0.3	0.0	-13.8	14.3	-13	13	26	v
38	4600	14	42.9	1.3	23.5	-23.7	10.6	7.	1.3	-0.3	-15.6	15.2	-12	7	28	٤
	05.07	52	43.3	4::	22.9	-23.4	11.9	-8.1	2.0	-1.1	-17.4	18.1	-11	13	30	٩
,		N. S. W.														

Table A-2 M30 mortar, 4.2-inch, firing M329A2 (M329A1E1)

	}	Best C	C Projectile: 332	M329A)El, fuze #557	1557			Elevations	; ou:	6005	at is					
	Sou	Source: FT4.2-K-					1		Also Curr	Currently Used	ed for 5	for Shell:				
2	Basic	Charge Corr.	Actuath Cor	Corrections				Lange	Range Corrections (metels)	yns (meter	[S]				Prob. El	Errors
Charge	-Sung-	1/8 Inc.	Orift Corr. to wet	Cross-Wind 1 knot	Muzzle Velocity I meter/sec	/elocity	Kange-Wind : Knot	e-Wini Kunt	Air Tempo	Temperature 18	Atr De	Density 1*	2	of 1 Sq	чалде	2ef1.
In	neters	meters	m118	s, îE	Dec.	Inc	Head	Tasi.	Dec.	Inc	Dec	٦٠.	oec Dec	Inc	Deters	meters
	910	23	17.6	7.	18.6		9.			0	2.	·3			4	~
2,5	1350	23	17.5	7.	21.5	-20.3	1.0	6	0	0	-1.0	٠.٠			6	-,
	CIR:	24	17.5	7.	23.9	-,2.8	1.6	-1.1	0	0	7:1	-1.7			2	~
ž	2290	34	17.4	5.	25.8	-24.9	2.2	-1.6	د	ا د	-2.7	2.7			16	æ
01	27.75	24	17.4	"	27.2	7.97	2.8	-2.2	c	O	-3.9	6.5	, -		61	F.,
125	3240	23	17.4		28.2	-27.7	3.5	-2.7	0	0	-5.2	5.3			22	6
51	3.00	23	17.4	*.	29.1	4.8	4.2	-3.3	0	ى	-6.7	6.9	3	¥	76	10
	(717	2.	17.4	*.	25.8	-29.4	b 7	8.1	O	6	-R. 2	8.5	HCAB	TCAI!	62	12
20	45.70	2.1	17.6	•	30.3	-30.0	5.5	4.4	°	5	6.6-	į.0	144 <b>A</b>	Iddy	32	12
275	0667	21	17.8		30.7	-30.4	6.2	-5.0	0	G	.11.6	12.0	ION	TON	2	=
2,	2400	20	17.9	٠	31.1	-33.8	6.8	-5.5	0	c	7.1-	13.4				
\$1.62	5813	20	18.0		3. 3	- 31.	1.9		0	0	-15.	6.5.1			L	S.
ខ	6210	20	0.8:		31.3	-31.4	10.7	-6 5	1.2	0	-13.2	); [			5	31
32	6530	20	1.8.1		29.8	-31.3	ī.ī.	-7.1	ا ا	7.	- i h. 9	- 6:			- 7	2.
34	0789	1.8	18.2		29.67	-29.4	11.1	-7.5	9.6	-2.1	-27.5	20.1	_		4.7	9,
SKRPK-	(01) 2	SARPA-PR (OT) 2765 Dae 75														

Table A-2 (continued)

			sic Projectile: M329AlEL fuze M551	29AlEL fuze	.:53		1	Eleva	Elevation: 900 mils	211s 00c						1
	Sour	Source: FT4.2-K-1	<b>(-1</b>						Also Cui	Also Currently Used for Shell:	sed for	Shell:				
Basic	Ü	Charge Corr.	Azimuth Currections	rections				<sup>F</sup> -Ange	Correcti	Corrections (meters)	ers)				Prob. E	Errors
Charge R	Range	1/8 Inc.	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle 1 met	Muzzle Velocity 1 meter/sec	Pange 1 x	Nange-Wind 1 kno:	Air Tem	Temperature 1	Air G	Lensity 13	Proj. Wt.	. ož 18g. Std.	Range	<u>8</u>
Inc	Deters	m,ters	mils	mils	Dec	Inc	Head	Tat1	ĕ	Inc	) 2	Inc	Dec	Inc	Meters	Belers
0	880	20	22.4	4.	18.1		::	_	-		ļ	_			٥	~
24	1310	22	22.1	7.	21.0	-19.8	=	4.		0	6:-	0:1			6	4
5	1.70	23	22.0	۶.	23.3	-22.3	1.7	1:1	0	0	-1.7	1.7			12	٠
74 2	2240	23	22.0	۶.	25.1	-24.2	2.3	-1.5	°	o	-2.7	2.8			16	~
10 2	2700	:3	21.9	9.	26.4	-25.7	3.0	-2.2	0	0	-3.9	7.0			61	-
124 3	3160	73	21.9	9.	27	-26.9	3.8	F2.8	0	0	-5.2	5.4			22	2
2	3690	22	21.3	7.	26.3	8.72-	4.5	1.4	0	D	4.3	9.9	31	я	25	12
175 40	4030	21	42.0	۲,	28.9	-28.5	5.2	0.4	c	0	-3.2	8.5	CVBI	CAB	:3	13
70 77	7450	21	22.1	.,	29.4	-29.1	5.3	9.7-	0	0	6.6-	10.2	raav	144A	31	15
2214 4	0987	20	22.3	.7	29.8	-29.5	9.9	-5.1	٥	0	-11.6	12.0	LUI	LOI	34	16
25 5.	5260	20	22.4	∞,	30.1	-29.9	7.3	-5.7	0	0	-13.4	13.9		i	ج چ	17
3,4	5650	20	22.4	8.	30.4	-30.2	8.3	-6.3	0	0	-15.2	15.8			39	ģ
30 60	0709	20	22.4	8.	30.4	-30.4	10.8	6 9		2	-17.2	17.8			4.2	8
32 6.	6350	6:	22.5	8.	29.0	-30.4	11.0	-7 3	5.5	2	-18.7	19.6			77	2
31 60	6650	, ,	22.7	во:	25.0	-28.6	11.0	80 1:-	10.4	-2.0	-20.4	20.0			97	22
																:

Table A-2 (continued)

Basic Charge   Rar		Source: F74. 2-K-1	(-1				ļ		Also Cur	Also Currently Used for Shell:	ed for	She11:				ı
	lic.	Charge Corr	Azimuth Corr	Corrections				Rance	Corrections	ons (meters)	ers)				Freb.	Errora
	Range	1/8 Inc.	Drift Corr. to Left	Crcss-WinJ 1 knot	Muzzle Velocity 1 meter/sec	le Velocity meter/sec	Range 1 kr	Range-Wind 2 knot	Air Temp	Temperature	Air D	Density 14	Proj. Wt.	t. of 15q	Nange	TJ &
inc	meters	meters	mils	mils	ů D	Inc	Wead Tail	Tall	ο <b>φ</b> Δ	Inc	ĕ	Inc	)ec	Inc	Deters	Deteza
0	770	13	37.1	9-	16.6		5'								٠	-3
24	11.0	20	34.5	9:	18.5	-17.5	1.0			0		<b>⊗</b> .			۵	٠
٥	1560	20	33.7		20.5	-19.7	1.7			0	-1.5	1.5			12	٥
ž	015.	21	33.4	۲٠	75.1	-21.3	2.3	-1.4		0	-2.4	2.4			14	i =
01	2380	20	33.2	<b>8</b> 0.	23.3	-22.7	] ;	-1.7	·	0	-3.4	3.5			91	2
123	2780	20	33.1	8.	24.2	-23.7	3.8	-2.4	0	٥	-4.6	4.7	37	3.	19	16
<del>-  </del> 의	31.70	19	33.1	ó:	24.9	-24.5	4.5	-3.1	0	0	-5.9	6.1	TCAH	HADI.	22	181
<u> </u>	3550	19	33.1	6.	25.5	-25.1	5.2	-3.7	C	0	-7.3	7.5	1444	,44V	25	70
2	3920	18	33.2	6.	25.9	-25.6	0.9	-4.3	Ċ	0	-8.8	9.1	TON	TON	27	22
- <del>5</del> 77	4280	18	33.3	6.	26.3	-26.1	6.7	6.4-	o	0	-10.3	1:0.7			30	77
52	.630	۲,	33.5	1.0	26 6	-26.4	1	5.5	O	0	11.9	12.3			3.2	26
274	9867	13	33.5	1.0	26.5	-26.7	8 3	0.9-	0	0	-13.6	1,7:1			3.5	28
20	5325	1.7	35.5	1.0	26.9	-26.9	10.3	-6.5	ę.	0	-15.2	15.9			3,	92
32	5635	17	33.6	0.1	25.8	-26.9	10.3	-7.1	11	2	-15.7	17.5			35	32
75	5852	15	33.7	1.1	25.8	-25.5	10.3	-7.5	8.8	-1.7	-18.1	17.8			1.5	33
1	1															

Table A-3 M101, M101A1 howitzer, 105mm, firing M1

	   		. 4 C 4 C 4 C 4 C 4 C 4 C 4 C 4 C 4 C 4	MJ. Fuze M557	1557			3	Charge: 1 (195.1 m/s)	1 (195.1	(8/6					
	Sour	Source: FT 1	105-н-7				<b>j</b>		Also Currently Used for Shell:	ently Use	d for 8	iheli:	H*O, M350, M84	2, жве		
	Betic	Elev. Corr.	Azimuth Corrections	rections				ande	Wange Corrections (meters)	ns (meter	, e				Prol. 7	Frrors
Range	Elev.	3 1043	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity l meter/sec	elocity r/sec	Range-Wind I knot		Air Temperature	rature	Air rensity	ns i ty	+roj. Wt.	or 154	P. 1.93	bef1.
Meters	mils.	meters	nils	#11c	Dec	Inc	Head	Tail	Dec	Inc	Dec	Inc	Dec	Inc	meters	meters
1000	136.7	2	2.1	.07	10.7	-9.2	2.	2	0	0	3	.3	-16	17	6	1
2000	295.5	9	5.0	.14	20.7	-18.0	٠.	9	2	C	-4.2	1.3	-30	115	12	-1
3000	520.7	3	8.6	.24	6.62	-26.2	ì:	-1.3	0	0	-2.8	2.9	-42	5.5	-1	2
3400	721.3	2	15.8	.33	30.7	-29.3	2.3	-1.8	0	0	-3.7	3.5	-45	95	61	2
3000	1042.4	3	35.1	65.	9.62	-25.7	2.5	-1.2	0	o	-3.4	3.4	-39	<b>(</b> †)	19	3
2000	1252.1	7	122.8	1.39	20.7	-19.4		-:	0	0	5	1.0	-24	26	16	3
1825	1275.0	,	152.4	1.39	20.0	-19.4	4	Γ.	0	0	5	٠.	24	37	97	۳.
								_								
											_					
SARPA-	100.7	SARPA-PR (UT) 2768 Dac 75														

Table A-3 (continued)

Source Flev.	FI 105-H-														
Flev. mile	lev. Corr.	. H- 3				j		Also Cur	Also Currently Used for Shell:	ed for	She 11:	M60, M360, M84	60, M84		
Flev.		Azimuth Corrections	ections				1 20	Range Corrections (meters)	and Care	-				40 30	
115.5		Drift Corr to teft	Cross-Wind	Suzzle Velocity	Plocity	Range-Win 1	ru i	Azz Temp	Temperature	Air Density	ensity	Proj. Wt.	. of 1 Sq	Range	i i
	Peters	m138	mile	i i	Inc	Head	7.911	ຊ   ວິດ ດີ	Inc	i ğ	Inc	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Inc	meters	Beters
	8	1:1	40.	8.6	-8.6	-7.	17	0	0	F. 3	<u>~</u>	-16	13	۰	
7.447 0007	7	4.0	ει.	0.61	-16.7	15	\$	•		17.5	1.2	-30	31	12	-
3000 410.9	٤	7.3	12.	27.5	-24.3	1.4	-1.2	-:-	0	80.7	2.8	-42	77	81	2
3900 688.8	7	14.7	. 34	32.2	-30.7	2.7	-2.2	1	0	8.7	5.0	-51	52	22	~
3000 1147.5	s	50.5	.81	26.5	-23.7	2.6	-:	0	o	-3.5	3.7	-37	39	139	4
1999 1290.0	6	205.2	1,60	19.5	1.91-	9	-:	ŋ	۰	9	٥	-26	27	52	4
_															
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							<del> </del>								
							<del> </del> 								
							<del>                                     </del>								
						<b> </b>	-					-			

Table A-3 (continued)

		Resic P	Rasic Projectale: Ml. Fuze M557	FUZE 14557	İ		ļ	ç	rge: 3	Chirge: 3 (21).2 E/S	<b>6</b> 7 E					
	Soci	Source: 77 105-H-7	1 -H-				1		Also Curi	Also Currently Used for Shell:	ed for	55e11:	ж67, М360, 984	6г. я84		1
a gar	Basic	Elev. Corr.	Azimuth Corrections	rections				960 Va	Corrects	Pange Corrections (meters)	(6)				Prob. E	Errors
Range	Elev.	1 91	Drift Sorr. to Left	Cross-W1.3	Muzzle V	Muzzle Velocivy I meter/sec	Pange-Wind	Wind of	Air Temp	Temperature	Air Density	nsity	Proj. Wt. 2 Sq	. of 1 Sq	Range	Defi.
27.678	mils	meters	m119	sl is	ů	inc	Head [Tall	718:	Dec.	Inc	ů Š	Inc	بغ	Inc	27.58	meters
10.0	95.0	u,	1.4	50.	8.3	ė. t-	7:	7	င	0	e: -	.3	-15	. o r t	9	-
2000	200.1	G	3.2	::	17.2	. : 5.3	5	5.	2	7.	-1.2	[2]	- 29	30	1:1	1
3040	324 €	15	5.4	81.	25.0	-22.4	1.1	-1.1	٠.3	.2	-2.7	2.8	07-	[7	įΤ	2
v007	6"067	\$	0.6	- 24	32.1	-29.0	2.2	2.1-	3	.2	8.4-	6 7	67-	51	ຄ	3
7,600	577.5	2	14.2	.30	34.1	-32.7	3.3	-2.7	3	.2	-6.5	8.8	5۲-	33	27	~
4500	1066.3	s	37.6	;; ¥.	31.6	-28.1	3.7	-2 3	2	7.	-6.0	6.1	77-	97	25.	S.
3050	27221	æ	16.8	1.17	77.77	-21.9	2.4	.7	2	.1	-3.4	3.1	- 31	33	~17	5
2295	1300.0	12	:03.9	1.79	20.4	-19.5	7	17.	2	~:	-1 5		۱i-	7:	1.1	5
												 			i	
SKRPA-P	(10) z	SARPA-PR (UT) 2/168 Dec 75													]	

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Table A-3 (continued)

Baric Range El	Sour															
		Source: 37 105-8-					l		Also Currently Used for Shell:	rently Js	ed for	Shells	жео, мзбо, мв4	0, M84		1
	i	Elev. Corr.	Azimush Corrections	rections				Penge	Range Corrections (meters)	ons (mete	rs)				Prob. Errors	Strors
	Elay.	:1:	Drift Corr. to Left	Closs-Wind L knot	i	Muzzle Volocity I meter/sec	Range-Wind 1 knot	Wind Ot	Air Tempo	Temperature 1%	Air Density	nsity	Proj. Wt	Wt. of 3 5g Std.	Range	Deft.
Meters, n	g; ,s	meters	mils	P118	pec	ju:	Read Tail	Tall	ာမေ	inc	် ဝိရင်	Inc	Dec	Inc	meters	meter:
10nc	0.1	13	7.0	£0.	7.9	1"2-	.1	1	c	0	3	.3	-13	13	9	-
3000	156.4	i 2	2.4	60	15.3	-13.8	7.	7	2	.2	-1.2	:.2	-23	24	Ιï	1
000	248.1	10	0.4	-15	12.4	-20.2	6.	8	7 -	۶.	-2.5	2.7	-33	34	16	7
0001	357.4	8	0.9	.21	29.0	-26.3	1.6	-1.5	e: .	بو	9.4-	4.7	07-	:5	22	2
2000	505.4	,	6.9	62.	35.0	-32.0	2.8	-2.5	-1.0	7.	-7.2	a.	-45	4.7	56	~
57.3C	721.4	r,	15.7	04.	35.6	-35.7	4.1	-3.4	6	·:	6.6-	9.6	-47	67	13	-7
2000	1047.1	\$	34.6	. 57	34.3	6.01-	4.7	-3.6	£"-	v:	0.6-	9.1	-39	Ţ	31	ý
4000	1192.5	8	58.5	86	27.8	-25.2	0.4	6	ζ	9.	7.9-	5.7	Si-	37	77	9
30.30	1299.4	13	161.4	7.6	31.8	5.05-	1.1	6	7'-	١.	-2.9	3.2	-17	20	20	9
27.33 13	13:0.6	7.	186.1	76.	20.8	-20.4	5	6	5	£.	-2.9	1.9	-13	\$:	20	so.
		-														
	_															

Table A-3 (continued)

																!
	Sou	Source: 7T 105-H-7	-#-7						Also Cur	Also Currently Used for Shell:	sed for	She 11:		<b>м60, м360, м8</b> 4		ı
a.	Pastc	Elev. Corr.	Azimuth Corrections	rections				1.A.19e	Ange Corrections (meters)	ons (mete	ers)				Prob.	Errora
Pange.	Elev.	l mil	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle l met	Muzzle Velocity l meter/sec	Renge	Renge-Wind I knot	Air Tenp	Tenperature	Air D	Air Density	Proj. Wt.	t. of 1 Sq	Pange	Deft1.
Me ters	mils	meters	mils	R:15	မို	Inc	Head	Tall	Sec.	Inc	ğ	Inc			2 0 1 0 4	
1000	7.95	17	· ·	70.	6.7	-5.9	٠:	1	9.	-		7	7	=	# C C C C C C C C C C C C C C C C C C C	e le le
2000	117.0	16	1.6	80.	12.9	-11.2	1.3	4	1.7	2	1.1	=	-20	21	, <u>s</u>	٠
3000	183.1	14	2.7	.12	18.9	-16.4	2.3	89.	2.4	2	-2.5	2.5	-28	29	7.1	٠   ^
4000	257.2	13	4.0	:1:	24.6	-21.4	3.3	-1.3	3.2	0	9.5-	4.5	-34	£	-	،   ،
\$000	343.4	11	5.6	.22	30.0	-26.2	4.3	-2.0	3.4	r.	9.9	7.0	07-	4.2	:   5	٠   -
9009	451.7	88	7.9	. 28	35.2	-31.0	5.4	-2.9	3.2	٠.	-9.8	10.1	-43	9.7	=	,   -
7000	6.25.0	-7	12.4	96.	39.0	-35.6	6.8	1.4-	2.8	6.	-13.5	14.1	-45	87	3 3	, ,
7200	697.4		14.7	.42	39.0	-36.5	6.8	-4.5	2.7	æ.	-14.4	14.7	-45	87	: 3	,   ,
7000	921.7	4	24.8	.58	39.0	-35.3	8. 9 8.	-5.8	2.4		-15.3	15.2	177	V		,   .
9009	1094.3	80	39.4	.76	34.3	-30.5	6.3	14 7	2.0	.5	-12.8	13.0	-34	£ 2	;	-   -
2000	120.15	11	59.0	1.03	28.9	-25.8	5.7	-1.8	1:7	7.	9 6-	200	-77	;	3 -	،   ،
4 200	1282.0	. 15	108.0	1.64	23.7	-21.3	3.6	-1.3	1:5	-3	0.5	00	-	3 8	- <del> </del> -	υ   o
3355	1320.0	1.0	197.3	2.:3	21.0	-19.9	7	1.3	1.4	۳.		2 "	- "	2 0	, E	»   ,
							<del> </del>	<del> </del>						`	1	
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	-							+	1						1	
1			-		1	+	†	+	+							
	_				-		-	~	-			-	-			

Table A-3 (continued)

-		Basic	Basic Projectile: "1, Fuze M557	. Fuze 4557				1 6	Charge: 6 (365.8 n/s)	(365.8 m/	( s					
	Sou	Source: FT 105	105-H~7				1		Also Cur	Also Currently Used for Shell:	ed for	She []:	460, M360,	360, 484		, ,
a)	Basic	Elev. Corr.	Azimuth Currections	rections				Range	Nange Corrections (meters)	ons (mete	(61)	} 			Prob. Erroru	Strore
Range	Elev.	1 m1	Corr. to Lef.	Cross-Wind I knot	Muzzle I met	Muzzle Velocity 1 meter/sec	Vange-Wind 1 kro:	ar.	Air Temp	Temperature 14	A17 E	ir bensity	Proj. F 2 Sq	Ft. of 15g	Range	3
Beters	#U.18	meters	m1.18	m,19	8	Inc	Head	21172	260	thc	ğ	Inc	)       	  -  -	meters	Beters
1000	8.02	23	٠:	01.	£.5	-4.5	,	. ا	2	-	80.		<b>G</b> C	م	٠	
0000	87.7	20	7.1	. 16	7.0	17.7	6.1	-2.2	6.3	-5.5	2.1	2.0	=			-   -
36-30	139.0	61	2.0	13:		8; 8;	1.,	7	6.	-i0.4		2	] =	1.5	]	,
0007	195.0	£1	3.0	. 25	:0.2	-10.3	6.5	-5.0	15.6	-15.5	\ \frac{\frac{1}{5}}{5}	5.6	===	22	=	.   .,
2000	256.6	15	4.1	38.	13.8	-11.7	5.8	-5.5	21.0	-24.0	-8.1	9	·	01	21	-
9009	326.0	:3	5.4	.34	13.5	-13.1	11.2	8:5	25.3	-24.0	1 7	11.2	1		2	
3000	407.4	11	7.7	- 39	15.3	-14.7	13.6	9.	29.2	-27.3	-14.6	14.9	7-		22	,   ,
8000	511.8	∞	ι. σ.	54.	17.5	-10.5	15.5	3	31.8	-29.2	8 8 1	19.4	0	~	27	~
9,000	709.2	٦	15.7	.5;	9.81	-18.7	15.9	8.11	32.6	-31.6	-23.9	24.0	۰	-2	23	-
8000	1044.1	80	35.6	68.	18.9	-17.6	15.5	9.7	28.6	-75.8	-23.2	23.0	1.	-3	3.2	0
7000	1:46.1	11	6.82	1.07	16.3	-15.6	13.5	7.	25.0	-22.7	-19.8	19.9	7	7-	28	J
9009	1223.6	71	69.8	1.36	14.3	-13.2	11.5	8.7	21.9	-20.1	-16.0	16.4	6	9	23	01
2000	1285.1	19	5 711	1.96	11.6	-10.5	8.8	-4.2	19.6	-18.3	-11.2	12.2	1.7	-73	-	2
	0.526,	25	215.8	2.55	8.6	-7.6	-	7:3	19.2	-18.7	-9.3	1	32	-30	=	0
							İ	-								
														1	1	
								+				$\uparrow$				
SARR-IN	42 (111)	SURPR-18 (111) 2/88 per 75											_	_		

Table A-3 (continued)

		Basic P	Basic Projectile:	ML. Firze M557				\ \frac{2}{5}	Tharge:	7 (464.8 m/s)	(8,0					ļ,
	Sour	Source: FT 105-H-7	H-7				ı		Also Cur	Currently Used for Shell:	ed for	5he11:	ж60, ч3	<b>я360, ж</b> 84	1	ı
e G	Busic	Elev. Corr.	Azimuth Corrections	rections				a Ganye	Corrections	ons (meters)	IS)				Prob. Errors	rrors
Range	Elev.	ı mil	Drift Corr. to Left	Cross-Wind . knot	Muzzle	Muzzle Velocity   meter/sec	Range-Wind l knot	Wind lot	Air Temp	Temperature 10	Air D	. Density	Proj. Wt 2 Sg	t. of 189 Std.	Range	Deft.
Meters	B1.19	meters	81.18	Mils	Š	Inc	Head	Tail	Dec.	Inc	<u> </u>	Inc	Dec C	Inc	meters	meters
1000	25.2	36	7.	80	4.2	-3.9	.1	-:-	2	.2	<b>B</b> 0. I	6.	6-	6	80	-
2000	55.3	30	1.0	.17	7.7	-7.3	g.	ı,	6	ø,	-3.4	3.5	-13	13	8	-4
3000	93.0	25	1.1	. 27	10.3	-10.1	1.5	7.7	-1.1	77	6.3	6.8	-13	7.	10	7
0007	136.4	2.2	2.1.	7.	12.0	-11.9	3.1	-2.9	1.4	-3.4	-10.2	9.6	-12	13	=	2
9005	0.285	20	3.4	0+.	13.3	-13.1	5.3	-4.7	8.3	-7.6	-13.1	12.3	-10	2	12	3
0009	238.6	18	4.3	.45	14.2	-14.2	9*:	-6.7	10.9	-12.2	-16.0	15.3	-88	ΰ	14	4
7,000	298.0	91	5.3	05.	15.2	-15.1	10.1	-8.7	16.0	-14.6	-19.3	18.7	4-	99	51	7
8000	365.0	14	7.3	. 54	16.1	-15.9	12.7	-10.8	30.6	-20.7	-23.0	22.7	~	-	16	2
9000	443.5	Ç.;	9.2	. 60	17.1	6.91-	15.3	-12.8	24.5	-24.3	-27.4	27.5	7	. 7-	18	9
00001	544.5	စာ	12.1	.66	18.3	-17.9	18.3	6.41-	27.4	-27.2	-32.6	33.4	71	7	20	٦
11000	764.2	2	20.3	77.	19.5	-19.2	18.3	-16.9	28.5	-29.3	-38.9	38.3	54	-20	22	6
10000	1018.2	6	37.6	1.12	18.3	-17.9	0.61	7.91-	26.2	-25.9	-39.1	38.0	27	-23	22	Ξ
0006	1112.3	13	9.67	1.32	16.6	-16.0	18.2	-14.5	27.6	-23.5	6'78-	34.3	26	-22	20	::
8303	1183.1	16	64.9	1.57	14.7	-14.1	16.9	-11.6	21.4	-21.4	-30.3	30.1	27	-23	17	12
7000	1240.4	13	90.1	1.94	12.6	-12.0	15.1.	-5.9	9.61	-19.8	-25.1	25.5	31	-27	15	12
0009	:285.0	25	146.2	2.76	10.0	-9.2	12.5	-6.9	19.9	-19.4	-18.5	20.1	6,3	-39	12	Ξ
5121	1315.0	34	248.4	3.28	6.8	-8.9	8.0	-5.9	19.3	-20.7	-18.5	13.8	4.7	09-	ü	1:1
SARPA-PR	(01)	55 Jue 75						1							1	

Table A-4 M102 howitzer, <sup>1</sup>05mm, firing M1

	1	'rrcr's	Deft.	meters meters	0	1	1	2	3	3	3							
		Prob. Errors	Range	neters	2	*1	::	77	20	7.4	11							
	78%		of 15g	Inc	17	32	4.5	51	0.7	2.5	2.1							
	M60, M350		Proj. Wt.	Dec	-16	-31	-43	-50	-38	-24	-20							
	hell: _			Inc	0.1	1.2	2.6	4.4	4.2		3.0				_		-	
	for Sh	2	Air Density	, S	-0.3	-1.1	-2.6	7:7	-4.3	-3.3	-3.0				 		 	
(s/m/s)	Also Currently Used for Shell: M60, M350,	Range Corrections (meters)		Inc	ن.0	0.2	7.6	6.5	7.0	0.3	6.3			-		<del> </del> 		
Churge: 1 (205 m/s)	ilso Curre	orrection	Air Temperature	∑ <b>e</b> c	-0.1	-9.5	-0.4	-0.7	-0.5	-9.4	-0.3							
, indo	*	Range	<u> </u>	1115	.0.1	7.0-	-1.6	- - -	-7.6	-3.7	-2.7		 					
 	. 1		Range Wind I knot	1004		۲.۶	1.1	6.1		1.1	3.5				 			
			1001'Y	Inc		-17.4	-25.5	- 30.9	-24.1	-15.7	-13.2	 						
			Muzzle Velocity I meter/sec	oec.	10.2	6.61	29.0	34.4	0.87	18.3	7 5 7				 			
uze, M557		ections	Cross-Wind 1 knot	mils	0.05	0.12	07.6	0.31	0.50	1.54	1.92							    
Basic Projectile: Ml. Fuze, MS57	2-5	Azimuth Corrections	Orift Corr. to Left	mils	1.9	4.5	a .8	57.5	8. F.2	104.0	129.3							
Pasto P	Source: FT 105-AS-2	Elev. Corr.	116.	meters	20	\$	7	£3	4	9	r.							A CAR
	Sour	Basic	Elev.	eliv.	133.5	203.9	27897	9.524	8:11:1	1295.6	1343.5							
		2	Pance	Menters.	1000	00:17	1009	3700	3000	2000	2077							66.8

Table A-4 (continued)

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		6 0 0 0	(F)	M), Fuze, P.53			 	#U	Charge :	. (22)	. (223 m/s)			ļ		
	Sour	###10 2005 800 800 800 800 800 800 800 800 800					1		Niso Curr	ently Use	A for s	hell: _	Also Currently Used for Shell: M60, M365, M84	784		
		Zlav. Coff.	Arisath Corrections	ect1019				Pange	Range Corrections (meters)	ns meter	(8)				Prob. Errors	rors
Fange	£3.64.			Cross-Wind	Muzzle Velocity 1 meter/sec		Range-Wind 1 knot		Air Temperatuse	rature	Air Censity		Proj. W.	of Sq	Range	Defi.
	-	Becers	mils	El La	i S	+	Head	[181]	Dec	inc	pec	Iro	Š	Inc	meters	meters
1,000	2.40.	1	9:1	0.05	4.6	-8.2	0.1	-0.:	0.0	0.0	-0.3	0.3	-15	15	r-	٥
2000	219.8		3.6	0.11	18.2	-15.1	7.0	-0.4	-0.3	0.2	-1-1	1.1	-28	29	2	7
3006	7 823	-	9.6	0.17	26.6	-23.6	0.1	-0.5	-0.4	7.0	-2.5	2.6	-39	14	61	
000	Say	, , , ,	12.5	0.2	34.3	-30.7	2.0	-1.7	-0.3	0.7	9.7-	6.9	65-	5.5	25	2
4300	594.1	2	17.6	0.33	34.1	-32.8	2.5	-2.0	-0.9	8.0	5.5-	5.4	-51	52	25	~
4,000	389.6	~	37.5	0.59	34.1	-29.6	3.2	-3.0	-0.8	6.3	-6.1	6.0	-45	4.7	25	5
3000	1196.7	9	69.1	1.03	25.1	-21.9	3.5	-3.1	-0.6	0.5	- ,	5/-	-32	34	19	9
2000	1242.1	۲,	122.8	1.8;	16.4	-14.4	3.6	-3.1	-0.4	7.0	-3.7	3.7	- 20	22	13	7
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					 	<u> </u>									 	
Sagge	Sayye-ak (01) 2/68	2/68 Dec 75														

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Table A-4 (continued)

		Basic P	c Projectile: Ml. Fuze, M55Z	Fuze, HSSZ				ર્સ	Charge:	3 (262 m/e)						
	Sout	Source: FT 10	77 105-A <sup>2</sup> -2				١		Also Curr	Also Currently Used for	ed for 8	She11:	, 150 150	H50, M350, H84		1
ស្ន	Basic	Elev. Corr.	Azimuch Corr	Corrections				2,4nge	Correction	Corrections (meters)	rs i				Prob. E	Errors
Range		1 10 1	Dr. ft. Copy. to Ceft	Cross-Wind I knot	Muzzle Velocity I neter/sec	elocity r/sec	Range-Wind 1 knot	Wand for	Air Temperature	erdture	Air De	Density 10	Proj. Wt. 2 Sq	. of 149	Range	Def1.
MALEES	mils.	peters	Rils	רוגש	Dec	Inc	Hoad	7811	ŏ.	Inc	u ac	Inc	Sec	Inc	meters	meters
1000	84.7	11	1. j	ن.05	4.4	-7.4	6.1	-0.1	0.0	0.0	-0.3	0.3	-14	14	٥	0
0007	177.	10	2.3	90.0	16.3	-14.5	9.6	-0.3	0.0	0.1	-1.1	1.1	-26	27	11	7
3000	282.4	6	6.4	0.15	23.8	-21.3	1.0	8°.0-	-0.2	0.3	-2.5	2.5	-36	39	10	1
0007	412.8	,	7.9	9.2	31.0	27.8	3.1	-1.4	-0.4	9.6	-4.4	4.5	5	£7	22	2
2000	525.3	-	14.5	0.37	36.3	-34.0	3.2	-2.1	-0.9	1.0	-7.1	7.4	-52	75	28	٤
5200	742.8	2	19.8	0.39	36.3	-35.2	3.2	-2.7	-1.1	1.1	-7.8	7.9	-53	54	28	3
2000	924.4		31.2	0.54	35.3	-33.1	3.7	-3.7	-1.1	1.1	-8.5	8.4	-48	52	59	νı
0004	1136.5	9	55.8	06.0	29.7	-26.2	3	-3.9	-0.8	5.8	-7.4	7.3	-37	39	54	æç
3000	1271.5	80	97.9	4.38	22.0	-19.6	4.4	-3.8	-0.6	9.0	-5.9	5. و	-27	29	18	6
2300	1341.3	6	117.6	1.33	4.71	-15.4	4.3	1.8	-0.5	0.5	-4.C	4.9	-21	22	16	10
SAMP	SANTAL-PR (OT) 2768 Dec 1	70 000		T	1			1								

Table A-4 (continued)

The contraction			Basic	Basic Projectile: MI.	Fuze, 2557				ซี	Charge:	4 (27)	4 (278 m/s)					
Date   Mainwith Corrections   France   Corrections (reters)   Projections (reters)   Proj		Sou		105-AS-2				ļ		Also Cur	rently Us	sed for	Shell		360, M84		1
Court   Cour															1000		1
DCIFF   Cross-Wind   Muzzle Velocity   Sange-A., of a large velocity   Linearized   ď	asic	Elev. Corr.	Azim'th	reccions				-Surge	Correcti	ons (mete	, 55 1-1					Errors	
m.15         m.16         Dec         Inc         Head         Tail         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc	Range	$\overline{}$	I mil	Drift Corr. to Left	Cross-Wind l knot	Muzzle 1 1 met	Velocity er/sec	Range	- ×, nd no:	Alr Temp	perature	Air D	ensaty	Proj. Wi	1 .:		Deff.
1.0         0.04         7.3         -6.6         0.2         -0.1         0.0         -0.3         -0.1         1.2         -12         1.2         -0.4         0.0         -0.1         0.0         -0.1         0.1         1.1         -12         2.2           3.6         0.08         14.2         -12.7         0.6         -0.4         0.4         -0.1         1.1         1.1         -2.2         2.3         2.4         2.5         2.3         2.4         2.5         2.3         2.4         2.2         2.3         2.4         2.2         2.3         2.4         2.2         2.3         2.4         2.2         2.3         2.4         2.2         2.3         2.4         2.2         2.3         2.4         2.3         2.4         2.2         2.3         2.4         2.3         2.4         2.2         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.4         2.3         2.3         2.3         2.3         2.3	Meters		maters	mils	mils	Dec	Inc	Head	Tail	Dec	Inc	3	Inc	11	IĻ	metera	Beters
2.2       0.08       14.2       -12.7       0.6       -0.4       0.4       -6.1       -1.1       1.1       -22       23         3.6       0.13       20.6       -18.5       1.3       -0.8       0.7       -0.3       -2.4       2.5       -31       32       1         5.5       0.18       26.8       -24.0       2.1       -1.4       1.0       -0.3       -4.3       4.4       -38       39       1         13.2       0.24       32.7       -29.7       3.1       -2.2       1.0       -0.1       -4.3       4.4       -38       39         13.2       0.24       32.7       -29.7       3.1       0.0       -0.1       -6.1       -6.1       -4.4       -38       39         13.2       0.24       32.7       4.7       -2.6       0.2       0.4       -9.7       10.1       -48       50       20         13.2       0.50       38.4       -35.2       4.7       -5.6       0.2       0.9       -17.1       11.6       -43       46         33.3       0.60       38.4       -36.2       5.6       -5.0       -0.2       0.8       -17.1       11.6       -43 <td>1000</td> <td>06.7</td> <td></td> <td>1.0</td> <td>0.04</td> <td>7.3</td> <td>-6.6</td> <td>0.2</td> <td>-0.1</td> <td>0.1</td> <td>0.0</td> <td>٥</td> <td>1</td> <td>-12</td> <td>1.2</td> <td></td> <td></td>	1000	06.7		1.0	0.04	7.3	-6.6	0.2	-0.1	0.1	0.0	٥	1	-12	1.2		
3.0       0.13       20.6       -18.5       1.3       -0.8       0.7       -0.3       -2.4       2.5       -31       32       13         5.5       0.18       26.8       -24.0       2.1       -1.4       1.0       -0.3       -4.3       4.4       -38       19       1         8.1       0.24       32.7       -29.6       3.1       -2.2       1.0       -0.1       -6.6       6       -44       45       2         13.2       0.24       32.7       -29.6       3.1       0.5       0.4       -9.7       10.1       -48       50       2         13.2       0.38       38.4       -36.2       4.7       -5.6       0.2       0.7       -10.9       11.0       -48       50       2         17.2       0.38       38.4       -36.2       4.7       -5.6       0.2       0.7       -10.9       11.0       -48       50       2         33.3       0.60       38.4       -34.0       5.6       -5.9       -0.2       0.8       -17.1       11.6       -43       46         52.0       0.38       31.6       -28.1       5.6       -5.0       -0.1       -0.1	2000	129.7		2.2	0.08	14.2	-12.7	9.0	10.	9.0	-6.1	-1.1	1	-22	23	,   -	}
8.1       0.18       26.8       -24.0       2.1       -1.4       1.0       -0.3       -4.3       4.4       -38       39       19         8.1       0.24       32.7       -29.1       3.1       -2.2       1.0       -0.1       -4.6       6.8       -44       45       2         13.2       0.32       38.4       -34.7       4.7       -3.6       0.2       0.7       -9.7       10.1       -48       50       2         17.2       0.38       38.4       -36.2       4.7       -3.6       0.2       0.7       -10.9       11.0       -48       50       2         33.3       0.60       38.4       -36.0       5.2       -1.9       -0.2       0.7       -10.9       11.0       -48       50         52.0       0.98       31.6       -28.1       5.6       -3.0       -0.2       0.7       -10.7       10.5       -36       29         107.2       1.74       25       -2.9       -5.0       -0.0       -0.1       0.5       -9.0       8.9       -26       29         107.2       1.79       1.8       -1.5       -2.7       -0.0       -0.1       0.7       -10.7 </td <td>3000</td> <td>218.3</td> <td></td> <td>3.6</td> <td>0.13</td> <td>20.6</td> <td>-18.5</td> <td>1.3</td> <td>-0.8</td> <td>0.7</td> <td>-0.3</td> <td>-2.4</td> <td>1</td> <td>-31</td> <td>32</td> <td>13</td> <td>_</td>	3000	218.3		3.6	0.13	20.6	-18.5	1.3	-0.8	0.7	-0.3	-2.4	1	-31	32	13	_
8.1       0.24       32.7       -29.1       3.1       -2.2       1.0       -0.1       -5.6       6.8       -24       45       2         13.2       0.22       38.4       -34.7       4.5       -3.1       0.5       0.4       -9.7       10.1       -48       50       2         17.2       0.38       38.4       -35.2       4.7       -3.6       0.2       0.7       -10.9       11.0       -48       50       2         33.3       0.60       38.4       -35.2       4.7       -3.6       0.2       0.7       -10.9       11.0       -48       50       2         52.0       0.98       31.6       -28.1       5.6       -3.0       -0.2       0.7       -10.9       11.0       -46       56       -3.0       -0.1       0.5       -9.0       8.9       -26       37         74.3       1.74       25.1       -2.2       1.5       -5.0       -0.1       0.5       -9.0       8.9       -26       28         107.2       1.79       18.6       -16.5       5.5       -1.9       -0.1       0.4       -7.1       7.0       -18       20         107.2       1.79	7:000	309.4		5.5	0.18	26.8	-24.0	2.1	-1.4	1.0	-0.3	-4.3	l	-38	1 3	82	-
13.2 0.32 38.4 -34.7 4.5 -3.1 0.5 0.4 -9.7 10.1 -48 50 2  17.2 0.38 38.4 -35.2 4.7 -5.6 0.2 0.7 -10.9 11.0 -48 50 2  33.3 0.60 38.4 -34.0 5.2 -7.9 -0.2 0.8 -17.1 11.6 -43 65  52.0 0.98 31.6 -28.1 5.6 -5.0 -0.7 0.7 -10.7 10.5 -34 37  76.3 11.24 23.1 -27.3 5.6 -5.0 -0.1 0.5 -9.0 8.9 -26 28  107.2 1.79 18.6 -16.5 5.5 -6.9 -0.1 0.4 -7.1 7.0 -18 20	\$0C0	621.3		8.1	0.24	32.7	-29.;	3.5	-2.2	1.0	6.1	1 4	ĺ	7,7	į	: :	۱ ۱
17.2       0.38       38.4       -35.2       4.7       -3.6       0.2       0.7       -10.9       11.0       -48       50         33.3       0.60       38.4       -34.0       5.2       -1.9       -0.2       0.8       -17.1       11.8       -43       45         52.0       0.98       31.6       -28.1       5.6       -5.0       -0.7       0.7       -10.7       10.5       -34       37         74.3       1.24       23.1       -27.3       5.6       -5.0       -0.1       0.5       -9.0       8.9       -2.6       28         107.2       1.79       18.6       -26.5       5.5       -1.9       -0.1       0.4       -7.1       7.0       -18       20	6000	388.6	}	13.2	0.32	38.4	-34.7	4.5	-3.1	0.5	0.4	6		87-	. 3	29	٠ -
33.3	630°	657.2		17.2	0.38	38.4	-35.2	4.7	-3.6	0.2	0.7	-10.9	11.0	-48	ê	0,	3
76.3     11.6     -28.1     5.6     -5.0     -0.2     0.7     -10.7     10.5     -34     37       76.3     11.24     23.1     -27.3     5.6     -5.0     -0.1     0.5     -9.0     8.9     -26     28       107.2     11.79     18.6     -16.5     5.5     -1.9     -0.1     0.4     -7.1     7.0     -18     20	9009	355 8	-7	33.3	09.0	38.4	-34.0	5.2	6.1-	-0.2	0.8	-17.1	E . B	-43	4.5	32	, a
107.2 1.79 18.6 -16.5 5.5 -1.9 -0.1 0.5 -9.0 8.926 28 107.2 1.79 18.6 -16.5 5.5 -1.9 -0.1 0.4 -7.1 7.0 -18 20	5000	1121.8	80	52.0	0.38	31.6	-28. i	5.6	- j.0	-0.2	0.7	-10.7		-34	37	28	2
107.2 1.79 18.5 -16.5 5.5 -19 -0.1 0.4 -7.1 7.0 -18 20	v007	1236.6	10	74.3	1.24		-27.3	5.6	-5.0	-0.1	0.5	0.6-	i	-26	28	23	12
	3000	1333.9		107.2	1.79	18.6	-16.5	5.5	ó.,	-0.1	7.0	4.7-	1	-18	R	-	2
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Table A-4 (continued)

			in the second se	Yuga West				8	Charge: 5	5 (325 m/s)	) (					
<del></del>	no;	Basic P	Projectile:				<b>j</b>		Also Currently Used for Shell:	ently Use	ed for 9		₩60, ж	ж60, м360, м84		
_   &	Besto	Elev. Corr.	Azimuth Corr	Corrections				Pange	Courections	ns (meters)	) (E)				Prob. E	Errors
Pana.	Elev.	1 91)	Crift Cold. to left	Gross-Wind	Muzzle Velocity I meter/sec	elocity r/sec	Range-Wind 1 km ot		Air Temperatura	rature	Air Density	nsity	Proj. Wt. 2 Sq	of 15g	Range	Defil.
He ters	3418	Reters		F118	ĕ	Inc	Read	7411	Dago.	Inc	u G	Inc	ů	Inc	meters	meters
1000	49.5	<u> </u>	0.7	0.05	5.3	4.4-	6.0	-0.3	2.4	- ۲.0	-0.4	0.4	6-	10	2	-
2000	103.2	18	1.6	60.0	9.7	-7.5	2.6	-1.0	6.8	-2.8	-1.3	1.3	-14	16	٥	-
3000	161.5	16	2.5	0.14	13.7	-10.3	4.6	-1.9	11.4	-4.8	-2.7	2.7	-18	23	8	2
000	225.7	\[ \text{:}	3.7	0.18	17.5	-13.0	6.5	-2.9	15.5	-6.6	-4.0	4.6	-21	25	6	2
\$000	297.7		5.1	0.22	21.3	-15.7	3.6	0.4-	19.1	-8.2	6.9	7.0	- 24	28	12	
ç,	381.6	11	7.0	0.25	25.1	-18.5	10.5	-5.1	22.0	4.6-	9.6-	9.8	-25	31	14	-7
2007	487.2		9.7	0.31	29.5	-21.5	12.0	-6.2	24.0	-10.1	-12.9	13.2	-26	33	18	4
8000	664.3		15.5	0.41	33.0	-25.0	12.5	-7.4	6.62	6.6-	-16.8	17.2	-27	34	22	9
8100	702.0	6	17.0	1.43	33.0	-25.4	:2.5	-7.5	23.9	8.6-	-17.3	17.2	-26	34	22	9
8000	885.0	2	26.3	0.56	33.0	-26.3	12.5	-8.4	23.9	-8.1	-19.4	17.2	-25	33	77	80
700C	1052.0	3	39.3	37.0	30.1	-22.9	11.3	-8.2	19.1	-6.8	-18.0	17.6	-20	27	22	6
0009	1153.8	111	\$1.2	1.31	25.5	-19.3	10.3	-8.0	16.3	6.6-	-16.2	6.61	-15	21	19	10
\$6.30	1237.0	13	64.7	1.32	20.8	-15.7	9.6	-7.8	13.7	-5.0	-14.3	14.0	-10	15	17	11
2007	1131.1	14	81.7	1.78	16.2	-12.1	911	-7.6	11.2	-4.1	-12.2	12.0	9-	10	14	=
3600	1339.2	14	90.0	2.04	14.4	-10.7	8.9	-7.6	10.1	-3.7	11.3	11.1	-4	œ	13	12
	_															
												_				
SARPA-	ik (01) 2	34474-14 (01) 2/68 Dec 75														

Table A-4 (continued)

		Busic P	Basic Projectile:	M1, Fuze, M557	15			ਿੰਦ	Charge: 6 1	(353 m/s)						
	Sout	Source: FT 305-AS-2	YS2				j		Also Cura	Also Currently Used for Shell:	ed for		M50. M360, M84	10, MB4		
.*	.••tc	Elev. Corr.	Azimuth Cor	Corrections				R.nge	Corrections	ons (meters)	rs)				Prob. B	Errors
Range	Elev.	1 mil	Drift Corr. to Left	Cross-hind l knct	Muzzle Velocity l meter/sec	relocity r/sec	Range-Wind 1 knot		Air Tempe	Temperature	21.7	Density	Proj. Wt.	. of 1 <u>Sg</u> Stc.	Range	Def1.
Meters	m11s	meters	mils	mils	Sec Dec	Inc	Head	1181	<u><b>8</b></u>	Inc	Sec.	Inc	Sec.	Inc	neters	reters
1000	35.5	26	9.0	0.03	4.7	5.4-	0.2	0.3	0.1	-0.2	-0.9	6.0	9	9	9	0
2000	77.9		1.2	0.13	7.9	-7.8	1.1	-1.3	1.2	-2.3	-2.8	7.7	89	8	و	0
3000	126.0	20	2.1	0.2:	5.6	6-6-	6.5	-2.9	5.1	-6.4	6.4-	4.6	-7	80	_	0
4000	179.0	18	3.0	0.23	11.4	-11.4	5.1	A.4-	10.2	-11.1	-7.0	8.8	9-	8	2	0
2000	237.3	16	4.2	0,34	12.7	-12.7	7.5	8.9-	15.6	-15.7	-9.5	9.3	-3	7	6	0
6000	302.2	15	5.5	0.38	14.0	-13.8	6.6	-8.5	20.6	-30.1	-12.5	12.3	0	,	10	0
7000	376.3	77	7.3	0.4.1	15.4	.15.1	12.4	. 17.7	25.2	-24.1	-15.8	15.7	7	-2	11	.,
8000	465.1	10	6.7	0.43	16.9	-16.4	14.8	-12.7	29.0	-27.6	-19.7	6.61	6	-7	13	ı
9000	585.8	9	13.5	0.55	18.8	-18.0	16.6	-14.5	31.5	-30.3	-24.2	25.0	91	-13	15	_
9400	734.2	- E	19.5	6.64	19.8	-19.1	16.6	-15.5	33.5	-31.4	27.5	27.1	2.1	-17	91	2
9006	971.7		34.0	. 0.85	19.5	-18.5	16.6	14.4	29.1	-27.0	-20-5	28.4	23	-20	1.7	m
8030	1083.4	11	44.5	1.07	17.3	-16.3	15.7	-13.4	25.5	-23.9	-27.1	26.3	22	-19	16	-
7000	1166.0	13	55.1	1.29	15.0	-14.1	14.6	-12.6	22.5	-21.1	-24.3	23.6	21	-18	14	2
9009	1236.3	5:	67.0	1.58	12.5	-11.8	13.7	-11.9	19.5	-18.2	-21.4	20.8	19	-17	12	v,
2000	1300.0	16	81.2	1.97	10.2	9.5-	13.0	-11.3	16.4	-15.3	-18.3	17.8	17	-15	=	۵
7400	1336.2	1,	91.4	2.29	8.8	-8.3	12.6	-11.1	14.6	-13.5	-16.4	16.0	16	71-	10	7
														·		
SAKPI-CO	MARKET (UI) 2100	00 Dec 75									] ]			1		

Table A-4 (continued)

		Buf.r P	Buff. Projectile: Ml. Elize, M55	1. Elize, 255.				5	Clarge:	(s)r 525) [	(s)					
	Sou	Source FT 105-AS-2	2				l		Also Curr	Also Currently Used for		Shell:	M60, M360,	60, 454		,
P.	Basic	Elev. Corr.	Azimuth Cor	Corrections				Parge	Pange Corrections	ons (meters)	(8)				Prob. E	Errors
Runge	Elev.	lim :	Stift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity 1 meter/sec	le Velocity metri/sec	Sange-Wan1 1 knot	kyn4 ot	Alr Tempe	Temperature 14	Air De	Densaty 16	Pro). Wt. 2 Sq	. of 15g	Pange.	8.11.
# 10 m	wile	meters	mils	:113	Dec	Inc	Heed	7411	Dec	Inc	ğ	Inc	S S	Inc	meters	meters
2000	49.3	34	0.9	0.15	7.3	-6.9	0.5	-0.5	-0.9	0.7	-3.3	3.3	-12	12	80	0
40.00	121.3	34	2.2	0.33	11.9	-11.7	2.5	-2.4	6.0-	-0.9	-11.2	10.8	6.	10	6	O
0000	217.2	61	4.3	0.46	14.3	-14.2	6.6	8.5	9.9	-8.3	-18.1	17.2	۲-	5	11	7
7000	273.4	11	9.5	15.3	15.2	-15.1	0.6	7.7	11.3	-12.6	- 21.5	20.6	-	1	13	1
8000	335.3	1.5	7.7	95.0	16.0	-15.9	11.6	8.5	16.1	-16.9	-25.2	24.5	ند	F)	À	r.1
0006	.804	13	9.5	0.61	16.8	-16.6	14.4	-11.9	20.5	- 70.9	- 39.3	28.8	12	6-	2	۲,
1000)	495.	10	12.1	0.67	7.71	-17.5	17.3	-14.3	24.6	-24.6	-34.0	33.9	1,	-15	16	2
000 : :	613.0	9	8.91	0.74	18.8	-18.4	15.9	16.2	27.5	-27.5	-39/3	40.9	27	-23	18	3
11530	:28.4	-	22.4	0.82	19.3	-19.0	18.9	-17.3	27.5	-28.6	-42.5	42.0	33	-28	50	47
11000	952.3	,	38.9	1.0R	19.0	-18.4	19.9	-18.5	26.0	-25.9	-44.8	43.8	37	-33	20	5
10000	1057.0	12	51.1	i. 29	17.3	16.8	19.6	-17.9	23.6	-23.6	-43.4	41.5	36	-32	19	2
0006	1132.2	1.5	63.6	1.52	15.5	15.0	19.0	-17.2	21.2	-21.4	-39.6	38.1	34	-30	17	9
8000	1195.4	IJ	76.2	1.78	13.6	-13.2	18.3	-16.5	19.1	-19.2	-35.6	34.4	31	37-	16	9
200c	1251.9	18	91.8	2.09	11.8	-11.3	17.7	-1+.1	17.0	-17.0	?1.5	30.5	28	-25	14	,,
9000	1304.2	20	111.1	2.50	6.6	-9.6	17.1	-15.5	8	-14.8	-27.3	25.5	57	-23	12	7
2400	1334.3	29	125.3	7.82	8.8	-8.5	15.8	-15.	13.5	-13.5	-24.;	24. ר	23	-21	11	ř.

Table A-5 M102 howitzer, 105mm, firing M548

		9.10	Def11.	meters		7	<u></u>	~	~	4	4												ļ	]   
	il	Prob. Errors	Range De	meters	-	14	17	21	22	14	14			$\dagger$						1				
		Pr	of 1 Sq Ru	$\Box$	8.1	33	4.5	87		26	77		-	+	-	_				+	1			
			اي نيا	Inc	-	$\dashv$	7	7					+	+						+	_			
			Proj. i	Š	-17	-32	77-	-47	-4]	-24	-23								_	1				
	Shell:		nsity	Inc	0.3	1.4	3.1	3.9	3.8	1.6	1.3			<u> </u>						$\downarrow$			<u> </u>	
(°/E	to lor	<u> </u>	Air Density	å	9.3	-1.3	-3.0	-3.7	-3.8	-1.4	-1.4						-	ļ	-	1		<b></b> -	-	
(195.1 m/s)	ntly Us	s (mete	sture.	inc	0.0	٥.٥	0.0	6.0	0.0	0.0	0.0													
) 	Also Currently Used for Shell:	Pange Corrections (meters)	Air Temperature	Dec	0.0	0.0	0.0	0.0	0.0	0.0	0:0													1
Charge:	ح	s abuse		2011	-0.2	-0.6	-1.4	-1.8	-1.9	7	1:1		1				T	1	T	1			i —	
	1		Pange-Wind 1 knot	Head 7	0.2	0.7	1.8	2.2	2.2	1.7	0.1	-	1	-	_									7
			-	╅╼	-9.2	-17.9	-26.0	-28.3	-25.3	-17.6	-17.0													
			Muzzle Velocity : meter/sec	Sec.	10.7	20.6	29.6	29.6	29.3	29.0	1.8.1		+						+-				-	
Fuze M557		10ng	P	1	70.0	0.15	0.27	0.33	0.59	1.26	1.44		+							_		† -		
4548, F		Correct	·	1			-	$\vdash$	-	<del> </del>	+		+			╁-	-	+	+	-		-	-	_
sic Projectile: M548,	-1	Azimuth Corrections	Drift.	M118	2.1	5.0	10.1	11.9	34.4	92.7	131.3													
Besic Pro	티	1100		Beters		٩	†-   ~	~	-			,												
	Source	ļ-	Elev.		2.	297.8	000	1 9	1		305.		1											-
			Jenge i E		<del>+</del> -	2000	8	801	962		7 7 7	17,7												_

Table A-5 (continued)

		Basic	Projectile:	48. Euze H55			ı	ŧ	Charge:	4 (245.1 =/8)	(8)					
	Sou	Source: FT 10	105-41'-1				1		Also Curr	Also Currently Used for Shell:	d for '	Shell:				
, a	Basic	Elev. Corr.	Azimuth Corrections	160110ns				виг зе	Range Correct.ons (meters)	ins (meter	·				Prob. E	Errors
Renge	Elev.	1 21	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle '	Muzzle Velocity l meter/sec	Range-Wind 1 knot	-Mind	Air Temperature 1%	rature	Air Density	nsity	Proj. Mt.	. of 15g	Range	P 11.
Meters	mils	meters	1.1s	-115	Dec	Inc	Head	Ta1:	oec Oec	Inc	ű A	Inc	Sec.	Inc	meters	Beters
1200	84.2	11	1.2	0.05	8.4	5.5	0.1	-9.1	0.0	0.0	-0.3	0.3	-15	16	9	0
2000	181.2	01	2.7	0.11	16.`	-14.5	0.5	-0.5	0.0	0.0	-1.2	1.2	-27	28	11	1
3000	20167	&	4.7	0.18	23.4	-21.1	1.2	1.1-	0.0	0.0	-2.9	6.5	-39	07	17	2
000	4.30.7	ç	7.5	0.25	30.2	77:7-	2.3	-1.9	0.0	0.0	-5.0	5.1	87-	67	22	2
\$000	1.565	2	14.7	6E.O	34.5	-33.0	3.8	-3.2	0.0	0.0	6.7-	7.9	-54	\$5	29	4
0005	1127.3	4	6.45	22.0	29.3	-24.2	6.4	6.5-	0.0	0.0	6.4-	6.9	-4]	۲۶	23	7
3000	1265.7	6	81.5	1.22	22.3	-20.1	3.3	-1.9	0.0	0.0	4.4-	4.4	-29	31	17	4
2374	1330.	1.1	150.6	1.59	18.5	-17.9	1.4	-1.9	0.0	0.0	-3.4	2.6	-20	22	1,	3
SKRPK-P	r (01) 2	SARPA-PR (UT) 2766 Dec 75			]			1								

Table A-5 (continued)

		Basic P	Basic Projectile:	M548 Fuze M557	7558			Cha	Charge: 5 (307.8 -/-)	/٣ 8.70٤)	7					
	Sou	Source: FT 105-AU-1	.c-1				1	•	Also Currently Used	ently Use	e for s	for Shell:				
	Basic	Elev. Corr.	Azimuth Corrections	rections				Pange '	Range Corrections (meters)	ns (meter	(8)				Prob. E	Errors
Range	Elev.	1 mal	Corr. to Left.	Cross-Wind 1 knot	Muzzle Velocity I meter/sea	'elocity r/sec	Range-Wind I knot	<del></del>	Air Tempe	Temperature 1	Air Density 14	nsity	Proj. Wt. 2.59	of 159	Range	Sefl.
Meters	#i13	neters	mıls	mils	)ac	Inc	Head	7411	Dec.	Inc	Dec	nc:	Sec	Inc	meters	meters
1000	↓	<u> </u>	9.0	20.0	5.9	-5.8	7.0	-0.1	9.0	-0.1	-0.3	0.3	-12	13	٥	0
2000	112.3	16	1.5	60.0	12.5	-11.0	1.3	-0.4	1.6	-0.2	-1.3	1.3	-22	23	6	-
3000	177.9	52	2.5	0.13	18.2	-16.0	2.3	6.0-	2.5	-0.3	-2.8	2.8	-30	32	13	2
7000	250.5	13	3.8	0.18	23.5	-20.8	3.3	-1.5	3.1	-0.4	8.4-	6.4	-37	38		2
2000	334.8	111	5.3	0.24	28.5	-25.3	4.5	-2.4	3.6	-0.5	-7.4	7.6	-41	4.3	22	3
0009	439.6	88	7.4	0.30	33.3	-29.6	5.8	-3.4	3.9	-0.5	-10.5	10.8	75-	44	27	-3
7007	597.6	4	11.4	0.39	37.7	-33.8	7.6	-4.7	3.9	-0.5	-14.2	14.8	-45	87	33	~
7300	689.7	6	14.2	97.0	7.1.	-35.0	7.6	-5.2	3.8	-1.5	-15.6	16.0	-45	2.7	33	\$
7000	952.1	7	26.5	0.61	37.6	-33.6	7.7	-6.5	3.3	7.0-	-16.5	16.5	05-	7.3	35	20
9009	1.0111	7	8.07	0 81	32.5	-29.0	7.4	-5.7	2.7	-0.3	-13.9	14.0	-34	37	30	9
5000	1215.4	11	59.0	1.03	27.3	-24.4	6.6	-3.8	2.2	-0.3	.11.1	11.7	-28	30	24	9
200%	1298.7	13	95.0	1.48	22.2	-19.8	5.2	-3.2	`.'	-0.3	-7.9	8.3	-20	22	19	~
3223	1350.0	5.5	168.5	3.88	18.7	-17.3	3.2	-3.2	1.7	-0.3	-6.7	5.5	-10	1.2	19	٥
<u> </u>																
	-															
THE REAL PROPERTY.	100	7/68 Nac X														

Table A-5 (centirued)

		e de la companya de l	ic Projectile: M	MS48, Fuse MS	M5.57		ĺ,	P. G	Charge: 6	(429.2 7.4)						
	Soul	Source: FT 10	FT 105-AU-1				1		Also Currently Used	ently Use	for	Shell:				
	Basic	Elev. Corr.	Azımuth Cor	Corrections	:			Sange (	Corrections (meters)	ns (meter	6				Prob. E	Errors
Range	Elev.	1 71	Drift orr to feft	Cross-Wind	Muzzle :	Muzzle Velocity I meter/sec	Range-Wind 1 knot	···	Air Tempe	Temperature 18	Air Dei	Density	Proj. Wt. 2 \$9	of 1 so	Range	Defl.
E C	m13.8	meters	mils	mals	580	Inc	Head Ta 1	- L	Dec	Inc	Dec	Inc Inc	Dec	Inc	meters	meters
100	29.6	<u> </u>	9.0	0.08	4.5	-4.2	0.2	-0.4	-0.1	0.1	-0.8	6.8	-10	0	7	0
2000	65.1	26	1.4	0.18	8 .:.	-7.8	0.7	-9.7	-0.4	-0.1	-3.2	3.2	-14	71	80	
3000	107.1	22	2.3	0.76	16.5	-10.3	2.0	-2.0	1.1	-2.6	-6.0	5.2	-15	16	2	-
0007	154.5	20	3.2	0.32	12.1	-12.0	3.8	-3.6	5.0	-6.4	-8.4	8.2	-14	1.5	13	2
3000	207.2	81	4.2	0.37	13.5	-:3.3	6.0	-5.4	9.5	-10.6	-11.1	11.1	-	12	1.5	_
0009	266.0	16	5.3	0.42	14.7	-14.5	8.4	-7.4	14.0	-14.5	-14.7	14.5	-7	g.	17	_
000,	332.8	14	6.7	0.48	15.9	-15.7	10.8	.9.3	18.1	-18.1	-18.	18.6	-2	7	21	-3
8080	411.4	1,2	8.5	0.54	17.2	-16.8	13.4	-11.3	21.6	-21.2	-23.0	23.2	5	?;	24	5
900€	511.2		11.0	0.61	18.5	-18.1	16.2	-:3.3	7.77	-23.9	-28.0	28.7	13	-10	29	۰
10000	680.6	· ·	17.8	0.75	20.1	-19.5	16.9	- 5.3	26.0	-26.0	-33.9	34.6	23	-19	34	7
10100	717.9	F1	17.8	0.75	20.1	-19.7	16.9	- 5.5	26.0	-26.2	-34.6	34.6	24	-20	34	
10000	882.7	m	25.9	0.91	20.1	-19.7	16.9	6.3	26.0	1.45-	-37.9	34.6	27	-23	37	80
9006	1045.9	6	38.9	1.12	18.8	-18.0	17.6	6.4;-	22.9	-22.1	-34.3	33.6	26	-22	34	6
8000	1140.5	12	51.3	1.32	16.9	-16.2	16.5	-13.2	20.3	-19.7	-30.3	29.9	54	-20	30	6
7000	12.4.1	51	67.2	1.58	14.8	-14.1	15.2	-10.8	18.0	-17.5	-26.0	25.9	23	-19	26	80
9009	1275.3	81	92.6	1.96	12.6	-11.9	13.6	-7.3	15.9	-15.6	-21.4	21.6	24	-21	22	80
\$000	1325.7	a	150.5	2.85	10.0	6.6-	11.4	-7.3	9.71	-14.5	-17.0	16.7	£.	-29	16	7
- MARS	SERVE - 1 (117) 2/00	7 Dec 73				-										

Table A-5 (continued)

		g of sea	ic Protectile: MS	M548, Fuze M557	7:			§	Charge:	7 (548.	(548.6 m/s)					
	Sour		105-AU-1				l	•	Also Currently Used for Shell:	ently Use	d for S	hell: _				1
ä	Basic	Elev. Corr.	Azimuth Cor	Corrections				Pange	Corrections	ns (meters)	18				Prob. E	Errors
Range	Elev.	1 mil	Drift Corr. to Jeft	Criss-Wind	Muzzle Velocity I meter/sec	r/sec	Range-Wind 1 knot		Air Temperature	rature	Air Density 10	sity	Proj. Wt. 2 Sq	of 1Sp.	Range	Deftl.
Meters	mils.	meters	mils	A118	Dec	Inc	Head	7411	Dec	Inc	Dec	Inc	Dec	Inc	meters	meters
2000	39.1	73	0::	0.13	6.6	-6.3	7.0	-0.4	-0.6	0.5	-3.0	3.1	-14	15	10	-
4000	6.46	30	2.6	0.29	11.3	-:1.0	2.0	-1.8	-2.1	1.5	-11.3	11.6	-11	13	12	2
9009	173.8	22	4.6	0.43	14.1	-13.9	2.2	-4.5	0.7	-2.7	-20.7	19.9	2	3	17	
7000	221.3	20	5.7	0.49	15.1	-14.9	7.3	-6.2	4.3	-6.1	-24.7	23.8		7	19	4
8000	274.6	18	. 0.7	0.55	16.0	-15.7	9.7	-8.1	7'8	7.6-	-28.8	28.0	6		2;	4
0006	334.6	76	8.5	09.0	16.8	-16.5	12.2	-10.1	12.4	-13.2	6,66-	32.8	71	-13	54	2
00001	707	13	10.3	0.66	17.6	-17.3	15.0	-12.2	15.9	-16.4	-38.3	38.2	25	-21	26	9
11000	488.1	11	12.7	0.73	18.5	-18.1	18.1	14 3	19.0	-19.2	-43.9	44.5	35	-31	30	7
12000	604.5	7	16.4	0.82	9.91	-19.1	20.2	-16 6	21.4	-21.6	-50.3	52.9	7.7	-42	33	30
12600	7.96.7	~	22.8	0.89	1.02	8.91-	20.2	-18.0	22.0	-22.8	-54.7	52.9	56	-51	36	6
1,2000	8.096	7	35.8	1.18	19.8	-19.2	20.2	-20.5	20.9	-21.3	-58.4	55.0	9	-55	38	13
11000	9.990!	12	6.97	1.37	18.4	-17.8	21.6	4.61-	19.0	-19.4	-53.7	52.2	57	-52	35	11
10000	1140.8	15	58.6	1.56	16.9	-16.2	21.0	-18.0	17.3	-17.8	-48.7	47.8	54	67-	32	::
9006	1200.8	18	72.9	1.79	15.2	-14.6	20.1	-16.0	15.8	-16.3	-43.4	42.9	52	-47	28	=
000_	1294.8	26	130.4	2.66	11.2	-10.6	17.4	-11.8	13.7	-14.2	-31.3	32.1	57	-52	21	6
9719	1325.	31	189.4	3.04	9.1	-8.8	15.4	-11.8	13.8	-14.4	-27.6	26.8	69	-64	21	6
STRPATE	SARPA-PR (OT) 2/88 Dec	788 Dec 75						1								]

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**《为了解的人员》** 

Table A-5 (continued)

		Basic P	o projectile:	MS48, Fuze MS57	. MSS7		ı	Charge:	~	RA (548.6 n/s)	(8/0					
	i de la companya de l		FT 105-AV-1			1	1	~	Also Currently Used	ntly Use	d for Shell;	hell:				,
	Those I							Panoe C	Range Corrections (meters)	15 (meter	(6				Prob. E	Errors
Ba	Basic	Elev. Corr.	Azymuth Corrections	rections									3	0. Je	Range	138
Range	Elev.	ושו	Drift Corr to Left	Cross-Wind	Muzzle Velocity 1 meter/sec	elocity r/sec	Range-Wind 1 knot		Alr Tempe	Temperature 18	Alr Der	Density	7 88	; š		
	1:	meters		m, ls	Sec.	Inc	Head	Tail	S S	Inc	ě	Inc.	ě	Inc	Becera	a John Marcella
1000	38.0		1.1	0.12	6.6	-6.3	7.0	-0.4	-0.6	6.5	-2.9	3.0	-14	15	01	-
900	0 70	30	2.9	0.28	11.4	-11.0	1.9	-1.7	-2.1	1.6	-11.1	11.4	-12	13	12	2
	1.1	2,5	2.7	0.41	14.6	-14.2	6.4	-4.4	0.2	-2.2	-20.6	20.0	7	S	17	
0000				5.4.0	1.7	-16.8	9.6	19.6-	7.4	4.6-	-29.5	27.8	2	0	24	4
0008	6.667	17	7.01	0.53	18.1	-17.9	14.2	-11.7	18.5	-19.2	-36.2	33.9	80	8-	28	٥
00001	7 000	1_	13.7	0.60	18.4	-18.3	20.2	-16.1	31.0	-29.5	-42.5	9.07	15	-12	32	-
1200				0.66	18.4	-18.3	26.8	-21.0	41.2	-38.0	-50,0	50.4	25	-21	38	2
14000	636.5				9	-18 2	4,	-24.2	43.2	-39.6	-56.6	58.7	29	2	7,	11
15300	852.9		78.0				3	,	0 05	-21.8	-63.1	63.6	12	8-	89	14
14000	1083 2	13	46.4	0.92	19.4	-18.4	8.4.		200.3			_1_			:	;
12900	1201.6	21	65.5	1.10	16.9	-16.0	23.0	-17.8	21.1	-17.4	-54.6	25.7	4	=	ê l	
10000	1.184.9	2;	91.7	1.38	13.6	-12.9	19.5	-12.7	16.2	-14.4	-44.2	45.4	-3	7	20	
8000	1349.5	36	149.2	7.04	9.6	-8.7	15.2	-11.5	13.4	-12.1	-32.8	33.8	22	ę l	75	
6985	1375.0	777	220.8	3.3	6.5	-6.0	11.6	-11:5	12.7	-11.8	-32.8	26.1	28	-24	Z.	=
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Table A-6 XM204 howitzer, 105mm, firing M1

		Prob. Errov	Range Def1.	meters																	
			cf 1 15	ŽIIC													-	`	   	<b>!</b>	
	ře 11 :-	}   	Air Density Proj. Wt.	Sec								-			† —	<del> </del>					
	d For Si		nsity	Inc		Ì		İ													
1	tly Cse	ers)	Air Dei	Dec					 									<del> </del> 	 		
, d	Also Currently Used For Shell:	lons (met	erature	Inc																	
Page À	۸1	Tange Corrections (meters)	Air Temperature	Dec																	
			Unrd o:	T. a. 1																-	
			Pand 1	Head	ļ 																
			Muzzle Velocity l meter/sec	Inc																	
			quzzle l net	ŝ																	
		Sucrape	Tross-Wind 1 knot	F115																	
Basic Projectile: "4]		Azımuth Corrections	Drift Corr. to Left	mils	5.1	18.5	43.2		18.5	43.5	5.1	18.5	43.9	5.0	28.5	44.1					
Basic Proj	nulations	Elev. Corr.	1 913	neters																	
	Source: Computer Simulations		Range	meters	2206	37.29	2818	2625	4396	3325	31.39	5232	19.19	4100	9299	5.365					, , , , , , , , , , , , , , , , , , ,
	Ge: Cui	Basic	Elev.	ดาไร	300	008	1155.6	300	800	1155.6	300	800	1155.4	300	909	1155.6			<del> </del>		22 (20)
	Sour		Charge	-:	,46 1			, 167 2	,		ж67 3	•		44	•						SABDA_W8 (OT) 22/9 Dar 25

Table A-6 (continued)

Source   Computer Simulations	Page 2 of 2	
Charge   Elev. Range   I mil   Corrections   I knot   I	Also Currently 3sed for Shell:	
Charge Elev. Range   Imil   Orifit   Cross-Mind   Wuzzlu indonomy   Indicated   Imil   Corr. to Left   I knot   Tango Corrections (neters)	Prob. Error	
mils meters retors mils 7:15 Sec inc Head 1	furge-lind Air Temperature Air Donsity Proj. Mt. of I knot it knot	f ! Range Def1.
"	ing Head Tail Dec Ing Dec Ing Dec	ing meters
" 1155.6 6395 " 300 6111 " 890 9748 " 1155.e 7505 " 467 300 1.544		1
"" 300 6111 " 300 6111 " 1155.6 6395 " 300 7506 " 300 1.54)		
" 300 6111 " 800 9748 " 1155.6 "505 " 600 1.540 " 1155.6 8935		
" 1155.6 "505" " 300 1.540		
" 1155.6 "505 " 300 1.544 " 1155.6 8935		
300 7506 300 1.54) 1155.6 8935		
aoo 1.544 - 1155.6 8935		
- 1155.6 8935		

Table A-7 M109 howitzer, 155mm, firing M107

	Sour	Basic Profes	Basic Protectile: M107, Fuze M557 FT-155-AH-3	7, Fuze 4557			1	9 9	Charge: 1G (207.3 m/s) Also Currently Used for Shell:	(207,3 m/s) ently Used 1	/s)	hell:	M110, M1:6, M121A1	A121M 3:		1 1
		rate of the state	Azimuth Corrections	rections				abue.	Range Corrections (meters)	ns (meter	ê				Prob. E	Errors
Range	Elev.	inil.		Cross-Wind	Muzzle Velouity l meter/sec	elcuity r/sec	Range-Wind 1 knct	_	Air Temperature	rature	Air Density 14		Proj. Wt. 4 Sq	of 15q Std.	Range	Def1.
Me te ra	mais	meters	rals -	Mils		Inc	Head Tail	Tail	Sec.	Inc.	Š	Inc	Dec	Inc	meters	meters
000:	120. 3	F2	2.1	0.05	10.1	8.8-	0.1	-0.0	0.0	0.0	-0.3	0.3	-10	=	7	-
2000	255.4	-	5.0	0.11	9.61	-17.1	0.5	7*0-	0.0	0.0	-1.0	1.0	-20	20	13	1
3000	424.7	\$	9.0	0.17	28.7	-25.2	1.2	-1.0	0.0	0.0	-2.2	2.3	-28	29	20	2
96.	, 90,		19.2	0.27	33 1	-32.1	2.1	-1.7	0.0	0.0	-3.7	3.6	-34	35	24	e l
2006	1161 6		59.2	0.67	28.7	-25.5	1.4	9.0	0.0	0.0	-2.0	2.2	-26	27	20	7
2257	0 0521		136.1	1.15	23.3	-22.6	6.0-	9.0	0.0	0.0	-0.3	-0.2	-18	61	41	ı
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SARPA	(or)	SARPA-PH (OT) 2168 Die 75									ļ			! 		

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Table A-7 (continued)

Sauces   Tri 135-Me <sup>2</sup>     Barie   Elev.   Corr.   Co			Basic	Basic Projectile: MAGT, Fuze M557	ī. Fuze M55ī			I	ਰ	Charge:	2G (23 <b>6.2 m/s</b> )	n(s)					1
Oct   Millingh   Oct		Soul	Ė	NH-S				ļ		Also Curr	ently Use	ed for		M110, M11	16, MI21A		1
DILITE   CLOSS-WAING   HUZZIJ-Velocity   Sente-Muid   Air Temperature   Air Temper	4	sic	Elev. Corr.	Azzmuth Corr	rections				Parrige	Correctio	ons (mete	(E)					rrors
s         mils         pail         Dec         lnc         Hosd         The         Dec         lnc         Dec         lnc         Dec         lnc         Dec         lnc         Dec         lnc         lnc <th>Range</th> <th>Elev.</th> <th>1 1 1 1</th> <th></th> <th>C.oss-Wind 1 knot</th> <th>Muzzle V l nete</th> <th>elocity r/sec</th> <th>Range-</th> <th>Fr.1.d</th> <th>Alr Temp</th> <th>erature</th> <th>A11 29</th> <th>nsıty</th> <th>Proj. WE 4 Sq</th> <th>of 15g</th> <th>Range</th> <th>Deft.</th>	Range	Elev.	1 1 1 1		C.oss-Wind 1 knot	Muzzle V l nete	elocity r/sec	Range-	Fr.1.d	Alr Temp	erature	A11 29	nsıty	Proj. WE 4 Sq	of 15g	Range	Deft.
1.6         0.05         8.8         -7.8         0.1         0.0         0.0         -0.1         9.3         -10         11         6           3.7         0.10         17.1         -15.2         0.5         -0.4         0.0         0.0         -1.0         1.1         -20         20         12           6.1         0.10         17.1         -15.2         0.5         0.4         0.0         0.0         -1.0         1.1         -20         20         11           0.1         0.21         24.9         -22.2         1.0         0.0         0.0         -2.1         2.3         22         18           1.0.1         0.21         32.4         -29.0         1.8         -1.5         0.0         0.0         -2.1         4.0         22         28         18         24         25	Meters	4-	meters		H. 18	š.	Inc	Head	Tail	Dec	Inc	Dec D	Inc	Dec	Inc	meters	
6.13         0.10         17.1         -15.2         0.5         -0.4         0.0         -1.0         1.1         -20         20         12           6.13         0.15         24.9         -22.2         1.0         -0.9         0.0         0.0         -2.1         2.3         -28         29         18           1.0.1         0.21         32.4         -28.0         1.8         -1.3         0.0         0.0         0.0         -3.9         4.0         -3         18         18           1.8         0.0         36.1         -38.9         3.0         2.4         0.0         0.0         0.0         -3.9         3.4         25           111.3         1.10         25.3         -28.9         2.6         0.0         0.0         -6.8         1.5         24         17           101.7         1.10         25.3         -28.4         0.0         0.0         0.0         -6.8         1.5         24         17           101.7         1.10         23.6         -23.4         -1.6         0.7         0.0         0.0         -0.8         -0.8         17           101.7         1.10         23.6         -1.6         0	1000	92.3	01	1.6	0.05	8.8	-7.8		-0.1	9.0	0.0	-0.3	0.3	- 10	11	90	1
6.5 G.15 24.9 -22.2 I.0 -0.9 0.0 0.0 -3.9 2.3 2.4 2.0 1.8 1.5 0.0 0.0 0.0 -3.9 4.0 -3.5 35 24 1.8 1.8 0.0 0.0 0.0 0.2 1.3 2.4 0.0 0.0 0.0 0.2 2.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	2000	193.5	6	3.7	0.10	17.1	-15.2	6.0	7.0-	0.0	0.0	-1.0	1.1	-20	20	13	1
18.3       -29.0       1.8       -1.5       0.0       0.0       -3.9       4.0       -35       24         18.3       0.21       32.4       -29.0       1.8       -1.5       0.0       0.0       -3.8       5.7       -41       42       25         18.3       0.5       0.5       0.2       0.0       0.0       -6.2       4.4       -12       35       25         111.3       1.10       25.3       -23.4       0.0       0.0       0.0       -6.5       1.5       -22       24       17         151.7       1.30       23.6       -23.4       -1.6       0.7       0.0       0.0       -0.8       -0.3       -22       20       17         151.7       1.30       23.6       -23.4       -1.6       0.7       0.0       0.0       -0.8       -0.3       -22       20       17         151.7       1.30       23.6       -23.4       -1.6       0.7       0.0       0.0       -0.8       -0.3       22       20       17         151.7       1.30       23.6       -23.4       -1.6       0.7       0.0       0.0       -0.8       -0.3       20       17 <td>3000</td> <td>309.5</td> <td>80</td> <td>6.3</td> <td>0.15</td> <td>54.9</td> <td>-22.3</td> <td>1.0</td> <td>6.0-</td> <td>0.0</td> <td>0.0</td> <td>-2.3</td> <td>2.3</td> <td>-28</td> <td>59 (</td> <td>81 81</td> <td>74</td>	3000	309.5	80	6.3	0.15	54.9	-22.3	1.0	6.0-	0.0	0.0	-2.3	2.3	-28	59 (	81 81	74
18.5       0.30       36.1       -34.9       3.0       -2.4       0.0       0.0       -4.2       4.4       -43       25         31.9       0.60       32.3       -28.9       2.6       -9.3       0.0       0.0       -4.2       4.4       -32       24       17         111.3       1.30       25.3       -23.4       -1.6       0.7       0.0       0.0       -6.8       1.5       -22       24       17         151.7       1.30       23.6       -23.4       -1.6       0.7       0.0       0.0       -0.8       -0.3       -22       24       17         151.7       1.30       23.6       -1.6       0.7       0.0       0.0       -0.0       -0.0       17         151.7       1.30       23.6       -1.6       0.7       0.0       0.0       -0.0       -0.0       17         151.7       1.30       23.6       -1.6       0.7       0.0       0.0       -0.0       0.0       0.0       -0.0       17         151.7       1.30       23.6       1.5       -0.2       20.0       17       -0.8       -0.3       -0.3       -0.3       -0.3       -0.3       -0.3<	7000	457.3	9	.0.1	0.21	32.4	-29.0	1.8	-1.5	0.0	0.0	-3.9	4.0	-35	3,6	54	-
111.3	0067	710.1	7	18.8	0:30	35.1	-34.9	3.0	-2.4	0.0	0.0	-5.8	5.7	-41	42	28	m
111.3 1.30 25.3 -23.4 0.4 0.7 0.0 0.0 -0.8 1.5 -22 24 17  151.7 1.30 23.6 -23.4 -1.6 0.7 0.0 0.0 -0.8 -0.3 -22 20 17  151.7 1.30 23.6 -23.4 -1.6 0.7 0.0 0.0 -0.8 -0.3 -22 20 17  151.8 1.30 23.6 -23.4 -1.6 0.7 0.0 0.0 -0.8 -0.3 -22 20 17  151.8 1.30 23.6 -23.6 -1.6 0.7 0.0 0.0 -0.8 -0.3 -22 20 17  151.8 1.30 23.6 23.6 23.6 23.6 23.6 23.6 23.6 23.6	0007	1110.3	9	51.9	0.60	32.3	-28.9	2.5	۳. د:	0.0	0.0	-4.2	4.4	-32	34	25	7
151.7 1.30 23.6 -23.4 -1.6 0.7 0.0 0.0 -0.8 -0.3 -22 20 17	3000	1241.5	01	111.3	1.30	25.3	-23.4	9.6	0.7	0.0	0.0	8.0-	1.5	-12	54	17	4
	2892	1270.		151.7	1.30	23.6	-23.4	-1.6	0.7	0.0	0.0	-9.8	-0.3	-22	7.0	17	7
														!		_	

Table A-7 (continued)

Source   S	Source:  Elev. Corr. Aximuth Corrections  Elev. T i mil Drift I knot I k	P		Also Currently Used for Sheil:	ntly User	101 3116				
State   Stat	##1. Elev. Coff. Arimuth Cofficions    Elev.   1 mil   Driff   1 knot     Mils   meters   mils   mils     67.3   14   1.1   0.04     139.3   13   2.6   0.07     139.5   12   4.3   0.11     307.6   10   6.4   0.15     415.7   3   9.1   0.20     588.9   5   13.8   0.20     1141.3   9   58.8   0.70     1141.3   9   58.8   0.70     1239.2   12   110.1   1.18     1239.2   15   152.2   1.52     1280.0   15   152.2   1.52	p": 1							Prob.	Errors
130-7.	Elev.         1 mil         Drift Left 1 knot	Cross-Wind	Fan	ge Correction	s merer	١.	-	1 4	6 Range	100 mg
139-1   Coff. to Left   1 knot   1 material   1 knot   1 material   1 knot   1 material   1 ma	Mail	****		Air		Air Densi	4 39	39 Std.		
139-13   14	ails         meters         rils         mils         Lec           67.3         14         1.1         0.04         7.5           139.3         13         2.6         0.07         14.6         -           218.2         12         4.3         0.11         21.3         -           218.2         12         4.3         0.11         21.3         -           307.6         10         6.4         0.15         27.7         -           415.7         3         9         9.1         0.20         33.9         -           415.7         3         2         20.5         0.31         40.3         -           1141.3         9         58.8         0.70         33.4           1129.2         12         100.1         1.18         27.4           1280.0         15         152.2         1.52         24.9	, 2014	+	+-	Inc	-	Š Č	Inc	meters	Betars
139.2   1a	67.3         14         1.1         0.04         7.5           139.3         13         2.6         0.07         14.6           218.2         12         4.3         0.11         21.3           218.2         12         4.3         0.11         21.3           415.7         4         9.1         0.15         27.7           588.9         5         13.8         0.20         33.9           739.3         2         20.6         0.31         40.3           1141.3         9         58.8         0.70         33.4           0         1239.2         12         1(0.1         1.18         27.4           0         1280.0         15         152.2         24.9	3	near.	+	T .	╁╌	2 -10	11	7	
139.1   13   2.6   0.07   14.6   -13.2   0.4   0.0	139.3         13         2.6         0.07         14.6           218.2         12         4.3         0.11         21.3           218.2         12         4.3         0.11         21.3           307.6         10         6.4         0.15         27.7           415.7         3         9.1         0.20         33.9           568.9         5         13.8         0.25         33.9           739.1         2         20.6         0.31         40.3           992.6         5         37.5         0.49         39.6           1141.3         9         58.8         0.70         33.4           0         1239.2         12         100.1         1.18         27.4           0         1280.0         15         152.2         1.52         24.9	7.5	0.0	<b>-</b> ¦		+-	-20	92	-	  -
218.2         12         4.3         0.11         21.3         -19.3         0.0         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         -1.7         0.0         0.0         0.0         -1.7         0.0         0.0         0.0         -1.7         0.0         0.0         0.0         0.0         -1.7         0.0         0.0         0.0         -1.7         0.0         0.0         0.0         -1.7         0.0         0.0         0.0         0.0         -1.7         0.0	218.2         12         4.3         0.11         21.3           307.6         10         6.4         0.15         27.7         7           415.7         3         9.1         0.20         33.9         7           568.9         5         13.8         0.25         33.9         7           739.3         2         20.6         0.31         40.3         40.3           1114.3         9         58.8         0.70         33.4           1239.2         12         100.1         1.18         27.4           1280.0         15         152.2         1.52         24.9	14.6	7.0		0.0	+	+-	53	=	2
415.7         10         6.4         0.15         27.7         25.2         1.4         -1.2         0.0         0.0         -5.6         3           415.7         3         415.7         3         9.1         0.20         33.9         -30.8         2.3         -1.9         0.0         0.0         -5.6         3           588.9         5         13.8         0.25         33.7         -36.3         2.5         -2.6         0.0         0.0         -8.1         8           139.3         2         20.6         0.31         40.3         -36.3         2.5         -2.6         0.0         0.0         -8.1         8           1414.3         9         58.8         0.70         33.4         -35.3         3.7         -0.9         0.0         -0.0         -9.2           1239.2         12         10.0         13.4         -25.3         1.5         1.2         0.1         0.0         -6.9           1280.0         15         152.2         1.52         24.9         -24.1         -0.7         1.2         0.1         -0.1         -0.1         -2.3           1280.0         15         152.2         24.9         -24.1	307.6         10         6.4         0.15         27.7           415.7         3         9.1         0.20         33.9           568.9         5         13.8         0.25         37.7           739.3         2         20.6         0.31         40.3           1926.6         5         37.5         0.49         39.6           1141.3         9         58.8         0.70         33.4           1239.2         12         100.1         1.18         27.4           1280.0         15         152.2         1.52         24.9	21.3	3		G		.7 -36	37	15	2
415.7         8         9.1         0.20         33.9         -20.0         -1.0         -1.0         -1.0         -1.0         -1.0         -1.0         -1.0         -1.0         -1.0         -1.1         8.1         -1.0         -1	415.7         3         9.1         0.20         33.9           568.9         5         13.8         0.25         33.7           739.3         2         20.6         0.31         40.3           1141.3         9         58.8         0.70         39.6           1239.2         12         100.1         1.38         27.4           1280.0         15         152.2         1.52         24.9	27.7		+	0.0	╁╌	.7 -42	777	2:	m
568.9         5         13.8         0.25         33.7         -36.3         2.5         -6.0         0	568.9         5         13.8         0.25         37.7           739.3         2         20.6         0.31         40.3           992.6         5         37.5         0.49         39.6           1141.3         9         58.8         0.70         33.4           1239.2         12         100.1         1.18         27.4           1280.0         15         152.2         1.52         24.9	4.55	}	-	0.0	+	87- (.	3 50	27	7
739.3         2         20.6         0.31         40.3         -78.9         4.1         -3.4         50.0         -9.2           992.6         5         37.5         0.49         39.6         -35.8         4.4         -3.3         0.0         0.0         -9.2           1141.3         9         58.8         0.70         33.4         -20.3         3.7         -0.9         0.0         -6.9           1239.2         12         12         1.5         1.5         1.5         0.1         0.0         -5.9           1280.0         15         152.2         1.52         24.9         -24.1         -0.7         1.2         0.1         -0.1         -2.3           1280.0         15         152.2         1.52         24.9         -24.1         -0.7         1.2         0.1         -0.1         -2.3	739.3         2         20.6         0.31         40.3           992.6         5         37.5         0.49         39.6           1141.3         9         \$8.8         0.70         33.4           1239.2         12         1ç0.1         1.38         27.4           1280.0         15         152.2         1.52         24.9	33.7	ç;	+	0.0	+	- 50	5.1	<u>_</u>	.^_
992.6       5       37.5       0.49       39.6       -15.8       4.4       -2.3       0.0       0.0       0.0       0.0       0.0       -6.9         1141.3       9       58.8       0.70       33.4       -20.3       3.7       -0.9       0.0       0.0       -6.9         1239.2       12       12       12       0.1       0.1       0.0       -3.4         1280.0       15       15       1.52       24.9       -24.1       -0.7       1.2       0.1       -0.1       -2.3         1280.0       15       152.2       1.52       24.9       -24.1       -0.7       1.12       0.1       -0.1       -2.3         1       1       1       1       0.0       -3.4       -24.1       -0.7       1.12       0.1       -0.1       -2.3         1       1       1       1       0.0       -3.4       -24.9       -24.1       -0.7       1.12       0.1       -0.1       -2.3         1       1       1       0       -1       -1       -1       -2.3       -1       -2.4       -2.4       -2.4       -2.4       -2.4       -2.4       -2.4       -2.4       -2.4 </td <td>992.6     5     37.5     0.49     39.6       1141.3     9     58.8     0.70     33.4       1239.2     12     100.1     1.138     27.4       1280.0     15     152.2     1.52     24.9</td> <td>40.3</td> <td>1.1</td> <td></td> <td></td> <td>+-</td> <td>3 -45</td> <td>5 47</td> <td>29</td> <td>٥</td>	992.6     5     37.5     0.49     39.6       1141.3     9     58.8     0.70     33.4       1239.2     12     100.1     1.138     27.4       1280.0     15     152.2     1.52     24.9	40.3	1.1			+-	3 -45	5 47	29	٥
1141.3 9 58.8 0.70 33.4 -20.3 3.7 -0.5 0.0 -3.4 1239.2 12 100.1 1.28 27.4 -25.3 1.5 1.2 0.1 0.0 -3.4 1280.0 15 152.2 1.52 24.9 -24.1 -0.7 1.2 0.1 -0.1 -2.3 1280.0 15 152.2 1.52 24.9 -24.1 -0.7 1.2 0.1 -0.1 -0.1 -2.3	1141.3 9 \$8.8 0.70 33.4 1239.2 12 100.1 1.28 27.4 1280.0 15 152.2 1.52 24.9	39.6	7.7	+	0.0	╁	37	7 39	8	9
1239.2 12 100.1 1.18 27.4 -25.3 1.5 1.2 0.1 -0.1 1280.0 15 152.2 1.52 24.9 -24.1 -0.7 1.2 0.1 -0.1 -2.3	1239.2 12 100.1 1.18 27.4 1280.0 15 152.2 1.52 24.9	33.4	E	-+-		+-	╁╌	-27 29	15	\ <u>'</u>
1280.0 15 132.2 1.52 24.9 -24.1 -0.7 1.2 0.1	1280.0 15 152.2 1.52 24.9	27.4	2	+	2 - C	+-	╁	-20 23	==	<u> </u>
		24.9	, , ,	-		+	+-		-	 
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Table A-7 (continued)

		0.01	Basic Protectile: M10", Fuze V537	, Fuze 1557			[   	1 8	Charge: 46	46 (317,0 m/s)	u.'s)					
	Sout	Source: FF-155-AH-3	AH-3				<b>.</b>	•	Also Currenily Used for Shell:	ently Use	d for S	hell: _	4110, 4116.	16. MI21AI		
	Basic	Elev. Corr.	Azimuth Corrections	rections				Pange	Corrections (meters)	ns (meter	(S)				Prob. 5	Frrors
Panye	£1cv.	1 112.2	Drift Sorr. to Left	Cross-Wind	Muzzle Velocity 1 meter/sec	elocity r/sec	Range-Wind	<b>——</b>	Air Tempe	Temperature	Air Density	nsity	Prc). W.	of 15g Std.	Range	₩1.
Betars	1113	meters		mils	Dec	Inc	Head	7311	280	Inc	Š	Inc	Dec	1nc	meters	meters
000;	51.1	61	9.0	59.0	6.2	-5.1	0.3	.0.	1.8	-0.3	4.0-	0.3	,-	61	\$	1
2000	105.5	18	1.9	0.07	9.11	7.6-	2.1	-ن.4	4.7	٠, ٥-	-1.0	6.1	-11	18	9	ı
3000	164.1	91	3.2	0.0	17.4	-13.6	3.6	6.6-	7.4	-1.1	-2.2	2.3	-25	47	6	2
0007	2.862	1.5	4.6	0.14	22.6	-17.7	5.0	-1.4	9.5		-3.9	3.9	-29	32	1.2	2
5060	300.0	13	6.2	0.15	27.7	-21.8	6.3	-2.1	11.3	-1.6	-5.9	0.9	-35	38	91	3
9009	383.5	1-1	8.3	3.22	32.7	-26.0	7.5	-2.8	12.5	-1.7	-8.3	۶.۶	- 39	77	21	4
7000	488.2	8	11.2	0.27	37.5	-30.1	8.7	-5.7	13.2	-1.8	-11.1	11.3	77-	67	27	5
8000	658.5		17.1	0.34	41.5	-34.5	9.2	6.4-	13.1	-1.8	-14.3	6.44	87-	53	34	4
8200	744.1	2	20.8	0.35	41.5	-35.4	9.2	-5.1	13.1	-1.7	-15.1	6.41	87-	53	7,1	9
8000	907.7		30.3	0.47	41.5	-35.6	9.2	-5.6	12.0	-1.5	-15.4	15.3	-47	52	36	,
7007	10/3.7	80	9.97	0.61	37.7	-31.6	4.7	-4.3	6.6	-1.3	-12.9	13.1	-41	46	31	8
0009	1173.1	12	65.3	0.79	32.8	-27.5	6.0	-1.4	8.5	-1.1	-10.N	10.4	-34	39	25	,
2000	1247.5	91	\$9.5	1.18	27.9	-23.3	3.5	0.1	3.5	-1.0	-6.1	7.1	-26	30	17	7
4125	1295.0	21	169.8	1.54	24.7	-21.1	3.5	0.1	7.3	-1.2	-3.9	2.6	÷1-	19	17	٥
SKRM-	SURPLIFICATION 2/68 Dec	700 Dec 75						1								

Table A 7 (continued)

			MIO7. First MS57	7. Fure M557				6	Charge: 50	(374.9 m/	1/s)					
	Sou	Basic P. Source:FT-155-/	55-AH-3							Currently Used for Shell:	d for S		ы110, ж	h110, M116, M121A1	A1	1
	Basic	Elev. Corr.	Azimuth Cor	Corvections				Pange	Pange Corrections	ns (meters)	رة ق				Prob. E	Errors
Range	Elev.	1 mil		Cross-Wind	Muzzle Velocity I meter/sec	elocity r/sec	Pange-t .rd 1 kr.ot	4 . r d	Air Temperature	rature	Air Dei	Density	Proj. Wt. 4 Sq	of 1 Sq Std.	Range	Def1.
Meters	ails	reters	mils	mils	Dec Dec	Inc	Head	T311	Se De	Inc	υ G	Inc	) Dec	Inc	neters	meters
1000	51.1	-61	9.0	0.04	6.2	-5.1	0.7	-0.1	1.8	-0.3	-0.3	0.3	6-	01	2	
2000	105.5	18	1.9	0.07	6: <u>-</u>	4.6-	2.1	4.0-	4.7	-0.7	-1.0	1.0	-13	18	æ	-
3000	164.1	91	3.2	0.10	17.1	-13.6	3.6	6.3	7.4	-1.1	-2.2	2.3	-23	26	6	2
0007	228.2	15	4.6	9.14	22.6	-17.7	5.0	-1.4	9.6	-1.3	-3.9	3.9	-29	32	12	2
3000	300.0	13	6.2	0.18	27.72	-21.8	6.3	-2.1	11.3	-1.6	6.5-	6.0	-35	38	16	۳
0009	383.5	=	8.3	0.22	32.7	-26.0	7.6	8.1-	12.5	-1.7	-8.3	8.5	-39	77	21	-3
75.30	488.2	8	11.2	0.27	37.5	-30.1	8 7	-:.7	11.2	-1.8	-111.1	11.3	77-	67	27	٥
8000	65R.5	3	17.1	0.34	41.5	-34.5	9.2	67-	13.1	-1.8	-14.3	14.9	87-	53	34	9
8.000	744.1	2	20.8	0.35	41.5	-35.4	9.2	-5.1	13.1	-1.7	1.2.1	14.9	87-	53	34	2
8000	907.7	3	30.3	0.47	41.5	-35.6	3.2	9.6-	12.0	-1.5	-15.4	15.3	-47	25	36	7
7000	1073.7	8	46.6	0.61	37.7	-31.6	7.6	5.1	9.6	-1.3	-12.9	13.1	-41	97	31	8
9009	:173.1	12	65.3	0.79	32.8	-:7:2	ပ စ	7 - 7	3.5		-10.0	10.4	-34	39	25	7
2000	1247.5	91	99.5	1.18	27.9	-23.3	3.5	0.1	7.5	-1.0	-6.1	1.1	-25	30	17	7
4125	1295.0	21	169.4	1.64	24.7	-22.1	-0.5	0.1	7.3	-1.2	-3.9	2.6	9!-	19	11	9
											_					
SARPA	1 (au) 2	SARPK-PH (UT) 2/68 Dec 75														

Table A-7 (continued)

Sequence   T-155-ode			e orang	Pasic Projectile: X107, Fuze X557	7. Fuze 4557			1	<del>S</del>	rge .	marge . 34 (269.7 m/s)	3)					
State   Corr.   Alimpth Corrections   State   Corrections   Stat		Pos	rce: FT-155-A	K-3				1		Also Curt	ently Use	d for s		M110, M1	15, MIZIA		Į
1875   1871   1871   1872	2	is to	Elev. Corr.	Azimuth Cor:	rections				abura	Correction		(8)				Frob. E	rrors
alls         mile         Ope         Inc.         Head [75,1]         Ope         Inc.         Ope         Inc.         Ope         Inc.         Ope         Inc.         Ope         Inc.         Ope         Inc.         Inc. <th< th=""><th>Zange</th><th>Elev.</th><th>1 81</th><th>brift Corr. to last</th><th>Cross-Wind 1 knot</th><th>Muzzle V 1 mete</th><th>elocaty r/sec</th><th>Pange 1 k-</th><th>Wind of</th><th>Air Temp</th><th>erature</th><th>Air De</th><th>nsıty</th><th></th><th>. of 152</th><th>Range</th><th>Deft.</th></th<>	Zange	Elev.	1 81	brift Corr. to last	Cross-Wind 1 knot	Muzzle V 1 mete	elocaty r/sec	Pange 1 k-	Wind of	Air Temp	erature	Air De	nsıty		. of 152	Range	Deft.
10 4         1.5         0.04         7.7         -6.9         0.1         -0.1         0.0         0.0         0.0         -7.7         7.8         9           145.5         1.3         2.7         0.07         14.9         -11.4         0.4         -0.1         0.0         0.0         0.0         -1.9         1.9         1.9           235.9         11         4.5         0.11         21.8         -19.7         0.0         0.0         0.0         -1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         0.0         0.0         0.0         -2.1         1.1         1.1         1.2         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         1.1         0.0	Me ters	+	Briters	male	ails	l š	Inc	Read	;e:1	Dec	Inc	oec Oec	Inc	Dec	Inc	neters	meters
135.6         13         2.7         0.07         13.4         0.4         -0.3         0.0         c.0         -0.9         1.0         -12         1.1         15 <th>1000</th> <td>02</td> <td></td> <td>1.2</td> <td>0.04</td> <td>7.7</td> <td>6.4-</td> <td>0.1</td> <td>-0.1</td> <td>0.0</td> <td>0.0</td> <td>-0.2</td> <td>0.2</td> <td>-7</td> <td>7</td> <td>80</td> <td>٦  </td>	1000	02		1.2	0.04	7.7	6.4-	0.1	-0.1	0.0	0.0	-0.2	0.2	-7	7	80	٦
225.9         11         4.5         0.11         21.8         -19.7         0.8         -0.7         0.0         -2.1         2.1         17         18         22           324.0         10         6.8         0.10         28.4         -25.7         1.4         -1.3         0.0         -2.1         2.7         -22         22         22           441.2         7         9.9         0.21         34.7         -11.5         2.1         -2.0         0.0         -5.6         5.8         -25         25         29           635.         3         15.8         0.28         19.5         -37.1         3.7         -2.0         0.0         -5.6         5.8         -25         25         25           700.7         3         18.8         0.11         39.5         -37.1         3.7         -1.2         0.0         -8.7         8.7         -28         25         26           1117.2         3         3.6         3.7         -1.4         0.0         0.0         -5.6         5.8         23         24           11280.0         15         4.0         0.0         0.0         -5.6         5.8         2.2         27	2000	145.5	13	2:12	0.02	14.9	-13.4	7.0	6.3	0.0	0.0	6.0-	1.0	-12	13	27	-
134.0         10         6.8         0.10         28.4         -25.7         1.4         -1.3         0.0         -1.7         1.7         -22         22         29           441.4         7         9.9         0.21         18.7         -11.5         2.1         -2.0         0.0         -1.7         1.7         2.0         2.0         -1.7         3.7         -1.0         0.0         -1.7         3.8         25         3.8         25         3.8         <	3000	228.9	=	4.5	0.11	21.8	-19.7	8.0	-0.7	0.0	0.0	-2.1	2.1	-17	81	22	7
441.4 7 9.9 0.21 34.7 -31.5 2.1 -22.0 0.0 -5.6 5.8 -25 26 56 56 56 56 56 56 56 56 56 56 56 56 56	000	324.0	01	5.8	0.16	28.4	-25.7	1.4	-1.3	0.0	0.0	-3.7	3.7	-22	22	59	1
625.       3       15.8       0.28       39.5       -37.1       3.7       -2.9       0.0       -6.1       3.4       -28       28       46         700.7       3       18.8       0.03       13.1       3.7       -1.2       0.0       -0.0       -8.1       8.7       -28       23       3.4         937.5       3       3       3.5       -36.1       3.7       -1.4       0.0       0.0       -8.1       8.7       -28       27       45         1117.2       8       54.0       0.644       34.2       -31.0       3.7       -1.4       0.0       0.0       -6.8       7.1       -21       25         11280.0       15       165.7       1.48       24.8       -24.1       -1.5       0.0       0.1       -0.1       -1.6       0.7       -7       8       29         1280.0       15       165.7       1.48       24.8       -24.1       -1.5       0.0       0.1       -0.1       -1.6       0.7       -7       8       29         1280.0       15       165.7       1.48       24.8       -24.1       -1.5       0.0       0.1       -0.1       -0.1       -0.1	2000	441.4	7	6.6	0.21	34.7	-31.5	2.3	-2.0	0.0	0.0	-5.6	5.8	-25	7.6	36	3
700.7       3       18.8       0.31       39.5       -39.1       3.7       -3.2       0.0       0.0       -8.7       8.7       -28       27       45         937.5       3       32.7       0.65       39.5       -35.7       4.2       5.4       0.0       0.0       -9.0       9.0       -26       27       45         1117.2       8       54.0       0.64       34.2       -31.0       3.7       -1.4       0.0       0.0       -6.8       7.1       -21       22       37         1226.0       15       16       0.64       34.2       -1.4       0.0       0.0       -6.8       7.1       -1.5       9.2       -6.9       9.0       -26       29         1280.0       15       165.7       1.48       24.8       -24.1       -1.5       0.0       0.1       -0.1       -1.6       0.7       -7       8       29         1280.0       15       165.7       1.48       24.1       -1.5       0.0       0.1       -0.1       -0.1       -1.6       0.7       -7       8       29         1280.0       15       165.7       1.48       24.1       -1.5       0.0 <t< td=""><th>9000</th><td>625.</td><td>·</td><td>15.8</td><td>0.28</td><td>39.5</td><td>-37.1</td><td>3.7</td><td>-2.9</td><td>0.0</td><td>0.0</td><td>-8.1</td><td>3.4</td><td>.28</td><td>28</td><td>77</td><td>۶</td></t<>	9000	625.	·	15.8	0.28	39.5	-37.1	3.7	-2.9	0.0	0.0	-8.1	3.4	.28	28	77	۶
1117.2 8 54.0 0.45 39.5 -35.7 4.2 1.4 0.0 0.0 -5.8 7.1 -21 22 37 1.125.4 11 90.8 1.06 24.1 -25.7 1.4 0.4 0.0 0.0 -5.8 7.1 -1.4 16 29 1.280.0 15 165.7 1.48 24.8 -24.1 -1.5 0.0 0.1 -0.1 -1.6 0.7 -7 8 29 1.280.0 15 165.7 1.48 24.8 -24.1 -1.5 0.0 0.1 -0.1 -1.6 0.7 -7 8 29 1.280.0 15 1.65.7 1.48 24.8 1.48 1.48 1.48 1.48 1.48 1.48 1.48 1	6 200	7.007	_	18.8	0.31	39.5	-30.1	3.7	-3.2	0.0	0.0	-8	8.7	-28	23	71,	5
1117.2 8 54.0 0.64 34.2 -31.0 3.7 -1.4 0.0 0.0 -6.8 7.1 -21 22 37  1225.4 11 90.8 1.06 2.11 -25.7 1.4 0.4 0.0 0 0 -3.7 4.3 -14 16 29  1280.0 15 165.7 1.48 24.8 -24.1 -1.5 0 0.1 -0.1 -1.6 0.7 -7 8 29  1280.1 10 10 10 10 10 10 10 10 10 10 10 10 10	9009	937.5		32.7	0.45	39.5	- 36.7	4.2	4	0.0	0.0	0.6-	0.6	-26	2.7	45	S.
1230.4 11 90.8 1.06 21 -25.: 1.4 0.4 0.0 0 0 -3.7 4.3 -14 16 29 1280.0 15 165.7 1.48 24.8 -24.1 -1.5 0 0.1 -0.1 -1.6 0.7 -7 8 29	5,000	1117.2		24.0	0.64	34.2	-31.0	3.7	-1.4	0.0	0.0	-6.8	7.1	17-	22	37	•
1280.0 15 165.7 1.48 24.8 -24.1 -1.5 0.0 0.1 -0.1 -1.6 0.7 -7 8 29	7,000	1225.4	11	90.8	1.06	2,1	-25.7	<u>.</u> .	0.4	0.0		-3.7	4.3	-14	16	29	5
	3275	1280.0	15	165.7	1.48	24.8	-24.1	- 	0	0.1	-0.1	9.1 <u>-</u>	0.7	<i>t-</i>	89	29	Ŷ
										i.							

Table A-7 (continued)

Besic Rance	ě	3									•	;	K110.	MIIO, MIIS, MIZIAL		
<u> </u>	1	Source: - 122	-155-An-3.				i	•	Uso Curr	Also Currently Used for Shell:	ed for				¥.	,
h	0	glev. Corr.	Azimuth Corrections	rections				aguage .	Corrections	ons (Aeters)	i.3.				Prob. E	Errora
	Elev.	) ad:	Orthe	Cross-Mand	Muzzle Velocity I meter/sec	'elocity 1/360	Range-wand 1 Prot		Air Temperature	grature	Air Density	nsı:y		Ht. of 189	Pange [Seff].	Sett.
_	at is	Meters	3116	91.18	s a	Inc	Head Tail	Tail	υ G	Inc	å	Inc	 	Inc	meters	Reters
	52.1	2	0.8	3.03	5.4	£.4-	c.2	-0.1	1.5	-0.2	-6.3	~ 0	';	~	-	
206.9	107.5	13	2.0	70.0	12.3	6.01-	i.9	7.0-	3.8	-9.4	-i.n	1.0	-13	2	Ξ	-
3000	167.2	15	3.2	00	18.6	-14.6	3.2	e. c-	5.9	-0.5	-3.2	2.2	<u>- 1</u>	61	15	2
4500	232. /	14	4.7	7:.0	22.4	-19.1	4.5	-1.	7.5	9.0-	-3.8	3.9	-22	2.3	21	2
<del>-</del> }	305.2	13	9.4	8:.0	28.6	-23.5	5.7	-1.9	8.8	6.0-	6.8-	6.0	-25	27	2.7	
2003	292.3		8.5	3.72	33.7	-27.9	8 9	-2.7	9.7	- ۲. ت	-8.3	, 4	-28	30	33	-7
╁	501.9	ec	11.5		38.5	-32.2	7.9	-3.6	16.2	-1.0	-11.1	11.3	-30	33	9	۰^
3000	. 90. P		18.8	0.15	41.6	-36.7	8.3	-4.8	10.0	-1.0	-14.3	14.5	-32	35	4.8	٥
+-	1050.3	۵	44.6	65.0	38.7	-33.2	7.2	-4.2	ð. <sup>5</sup>	-ن٠٠	.12.8	13.6	-27	ž	43	8
3000	164.7	=	63.1	2: °C	33.6	-28 8	5.3	-1.5	5.6	-0.7	-9.9	4.31	-22	25	36	_
	: 242.2	23	95.4	51.13	28.5	-2:.è	3.4	0.4	5.7	-0.6	-,.2	7.1	-15	18	56	
4055	1295.	21	175.3	1.19	25.3	-21.9	-1.2	٥.4 أ	5.5	-0.7	-3.4	2.1	Ş	,_	25	2
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- <del> </del> -						<u> </u>								 		
-																
+												_	-			

Table A-7 (continued)

		Basic P	Basic Project!le:	07. Euze MSS.				4.5	Irge:SW	Charge: 5W (173.4 m/s)	(%)					
	Sou	Source: FT-155-	55-AH-3				ı		Also Cur.	Also Currently Used for Shell:	ed for	Shell:	M110, W	M116, M121A	5	1
ď	Basic	Elev. Corr.	Azimuth Corrections	rections				Range	Corrections	ons (meters)	r 9 )				Prob. E	Errors
Range	Elev.	l mil	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle ' I net	Muzzle Velocity I meter/sec	Range-Wind I knot	-Wind	Air Temperature 1%	erature	Air Density	insity	Proj. W.	W. of 1Sa Std.	Range	Def1.
Meters	Bils	meters	mıls	mils	ĕ	INC	Head	7 <b>4</b> 11	Sec	Inc	Dec	lnc	Dec	Inc	meters	meters
1000	38.6	24	0.8	0.08	5.0	-4.8	0.2	-0.4	0.1	-0.6	-0.7	0.7	9-	9	,	7
2000	82.8	2.5	1.9	0.15	8.0	-8.1	1.2	-1.7	2.0	-3.8	-2.1	2.0	ac T	6	O!	2
3000	131.2	20	3.0	0.19	10.0	-10.2	3.0	-3.4	6.6	-8.4	-3.6	3.5	6	10	12	2
0007	183.5	87	4.1	0.23	11.7	-11.9	5.2	-5.2	12.0	13.2	-5.4	5.2	6	01	71	3
2000	240.3	11	5.4	0.27	13.4	-13.4	7.5	-7.1	17.3	-17.7	-7.4	7.4	6-	10	91	3
9000	302.8	15	6.9	0.30	15.1	-15.0	9.7	-8.9	22.0	-21.8	-10.2	10.1	8-	6	6]	
7000	373.7	13	8.7	0.34	17.1	-16.6	11.8	-10.4	26.0	-25.3	-13.2	13.2	-7	8	23	7
8000	457.9	11	6.01	0.38	19.2	-18.5	13.8	-12.2	26.5	-28.3	-16.7	16.8	Ş-	7	22	~
0006	570.0	7	14.4	0.43	21.7	-20.6	:5.5	-13.7	31.6	-30.8	-20.6	21.0	-4	5	32	٠
9800	778.8	2	22.9	0.50	23.3	-22.6	15.5	-14.9	31.9	-32.1	-24.2	23.5	-2	7	34	7
0006	1005.3	<b>®</b>	38.9	0.71	23.2	-22.1	15.1	-11.2	28.9	-27.1	-23.4	23.2	-1	3	37	٥
8000	1110.9	11	52.5	0.83	21.0	-19.8	13.1	-8.4	25.5	-24.2	-20.1	20.2	0	2	31	6
7000	1187.5	15	65.7	1.07	18.5	-17.3	11.0	-4.4	22.7	-21.8	-16.4	16.8	2	0	26	6
9009	1247.4	19	99.7	1.45	15.6	-14.4	8.2	-3. i	20.7	-20.1	-111.5	12.8	7	-5	20	20
5040	1290.0	26	162.5	1.94	12.3	-11.5	3.2	<u>,</u>	26.4	-20.3	8.6-	7.3	61	ź1-	20	r.
								· 								
SAM	(00)	SKRW-11: (01) 2100 10c 75														]

Table A-7 (continued)

		Basic P	Basic Projectile: MIO7, Fuze M557	7. Flize 4557				€	arge: 6	Charge: 6W (461.8 m/s)	18/11					
_	Sou	Source: FT-155-	155-AH-3				1		Also Cur	Also Currently Used for Shell:	ed for		M110, M1	M110, M116, M121A1		1
æ	Basic	Elev. Corr.	Azimuth Corrections	rections				Range	Corrects	Range Corrections (meters)	rs				Prob. E	Errors
Range	Elev.	1	Orift Corr. to Left	Cross-Wind 1 tnot	Muzzle V I nete	Muzzle Velocity I meter/sec	Range-Wand 1 knot	-Kind	Air Temperature	erature	Air D	Air Density	Proj. Wt.	std.	Range	Peti.
Meters	mals.	meters	mils	m118	Dec	Inc	Head Tail	Teil	Sec.	Inc	õ	Inc	Dec	Inc	Beters	meters
2000	53.8	32	1.4	0.13	8.1	-7.6	7.0	4.0-	-0.8	0.7	-2.6	2.7	-12	12	01	_
4000	126.5	24	3.5	0.27	13.8	-13.4	2.0	-2.0	-1.7	-0.5	-9.2	9.0	-15	91	152	2
9009	218.8	20	6.0	78.0	16.8	-16.3	5.7	-5.2	5.5	-8.0	-15.1	£3	-15	91	6	2
8000	329.3	16	0.6	رنې.0	19.1	-18.9	10.3	0.6-	15.2	-16.5	-21.1	20.5	-12	-2	22	N
10000	469.4	12	13.1	0.52	21.6	-21.2	1.51	-12.9	23.1	-23.6	-28.8	28.8	-7	6	27	9
12000	746.2	3	23.8	0.66	24.7	-24.1	17.9	F16.5	27.1	-28.6	-39.0	37.8	0	3	33	۰
1,2000	848.3	3	5.62	0.76	24.7	9.57-	17.9	-16.5	27.1	-27.4	-42.1	37.8	_	2	32	01
10000	1105.3	71	56.1	1.0.7	21.7	-20.9	16.8	-12.6	22.1	-28	-34.4	34.0	7		29	==
8000	1221.6	22	91.8	1.54	17.0	-16.2	13.2	-5.1	19.0	-19.8	-24.6	25.4	=	٩	22	2 €
6293	1285.0	35	184.6	2.25	11.2	-10.6	5.6	-5.1	18.9	-20.7	-19.2	16.0	23	-29	20	<b>B</b> O
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	<del>-</del> †	İ	1											   	-	
-		-												-		
SKRPA-PR	(OI) 27	SIRPA-PR (OT) 2700 Dec 75													1	

Table A-7 (continued)

			Basic F	Projectile: M107.	7. Fize MS57			ļ	€	charge: 7	7W (562.4 m/s)	1/8)					
Corr. to Late   Line	Sou	.rce: _FT-155-	1.48-3				1		Also Cu	rrently Us	sed for		M110, Mi	16, K121A1		ı ı	
Dilit	ā	sic.	Elev. Corr.	Azimuth Cor	rections				Range	Correct	ions (mete	rs)				Prob.	Errors
1	Range	Elev.	) mil	Srift Corr. to Left	Cross-Wind 1 knot	Muzzle 1	Velocity FI/Sec	Range	-Wind not	ALE Tem	persture	Air D	ensity	Proj. Wt	. of 15q	Range	7 7 7
1	Meters	<b>}</b> ↓	Deters	make	1118	Dec	Inc	Head	Tail	) Je	Inc	ž	ou I	ě		at or a	1
2.5         .20         i2.2         -11.7         1.2         -1.1         -2.7         2.5         -9.0         9.4         -22         25           4.6         .33         16.3         -15.9         3.2         -2.8         -5.1         3.4         -19.4         19.4         -21         22           7.3         .44         18.9         -18.6         6.6         -5.7         -1.6         -1.8         -28.6         27.1         19.4         19.4         27         22           10.5         .53         20.9         -20.6         11.1         -9.4         6.8         -28.4         43.8         -10         13           10.5         .51         22.7         -27.4         10.1         13         15         16.8         -24.4         43.8         -10         13           21.7         .71         22.7         -27.4         10.1         13         15         16.2         -24.4         43.8         -10         13           28.4         .75         .72         20.5         -11.3         10.2         -12.6         10.2         -22.6         20.7         -22.6         22.6         22.6         22.6         22.6         22.	2000	35.6	90	1	60'	6.7	-5.4	7.	1		 	-2.3	<b>.</b>	  - 	91	=	
4.6         .33         16.3         -15.9         3.2         -2.8         -5.1         3.4         -19.4         19.4         -21         22           7.3         .44         18.9         -18.6         6.6         -5.7         -1.6         -1.8         -28.6         27.1         -19         20           10.5         .53         .20.9         -20.6         11.1         -9.4         6.8         -9.4         -37.1         34.5         -15         18           10.5         .61         .61         -9.4         -9.4         -9.4         -9.1         19         20           21.7         .71         .27.5         -27.6         10.1         17.3         16.5         -44.4         43.8         -10         13           21.7         .71         .27.5         -27.6         10.7         -17.3         10.7         -17.3         10.7         -17.3         10.7         -17.3         10.7         -17.3         10.7         -17.4         43.8         -10         20         -2         2         2         2         2         2         2         2         2         1         2         2         2         2         2         2	7000	82.2	37	2.5	.20	12.2	-11.7	1.2	-1.1	-2.7	2.5	-9.0	+-	-22	25	:	^
7.3         .44         18.9         -18.6         6.6         -5.7         -1.6         -1.8         -28.6         27.1         -19         20           10.5         .53         20.9         -20.6         11.1         -9.4         -5.1         34.5         -15         18         20           14.6         .c1         22.7         -22.4         16.1         -13.3         15         16.5         -44.4         40.8         -10         13           21.7         .71         25.3         -24.7         20.5         -11.3         20.2         -21.7         -55.3         50.7         -2         5           28.4         .75         25.9         -24.5         20.5         -18.6         20.5         -21.7         -55.3         50.7         -2         5           42.3         .75         25.9         -25.4         20.5         -18.6         20.5         -21.7         -55.3         50.7         -2         5           42.3         .75         25.9         20.5         -18.6         20.5         -21.6         50.7         -52.4         50.7         -2         5         7           64.9         1.27         22.6	9000	145.3	2.7	4.6	.33	16.3	-15.9	3.2	-2.8	-5.1	3.4	-19.4	+	-21	22	61	_
10.5       -5.3       120.9       -20.6       11.1       -9.4       -9.4       -15.1       34.5       -15       18         14.6       .61       .61       -17.3       15.       -22.4       40.4       43.8       -10       13         21.7       .71       25.3       -22.4       16.1       -11.3       15.       -44.4       43.8       -10       13         21.7       .71       25.3       -22.4       16.1       -11.3       15.2       -21.7       -55.3       57.7       -2       5       5         28.4       .75       25.9       -25.6       20.5       -18.6       -0.5       -22.6       50.7       -22.6 </td <td>8000</td> <td>227.6</td> <td>22</td> <td>7.3</td> <td>77</td> <td>18.9</td> <td>-18.6</td> <td>6.6</td> <td>-5.7</td> <td>-1.6</td> <td>-1.8</td> <td>-28.5</td> <td><b>→</b></td> <td>61-</td> <td>22</td> <td>24</td> <td>7</td>	8000	227.6	22	7.3	77	18.9	-18.6	6.6	-5.7	-1.6	-1.8	-28.5	<b>→</b>	61-	22	24	7
14.6       .C1       22.7       -22.4       [6.1]       -13.3       15       16.5       -44.4       43.8       -10       13         21.7       .71       25.3       -24.7       20.5       -11.3       20.2       -21.7       -55.3       57.7       -2       5         28.4       .75       25.9       -25.6       20.5       -18.6       20.5       -22.6       50.7       2       2       2         42.3       .98       25.9       -25.4       20.5       -19.5       10.2       -62.4       59.7       2       2       2         98.7       1.27       22.6       -21.9       20.1       -15.7       16.2       -17.9       -52.6       51.9       9       -4         191.9       2.47       11.3       -14.1       9.3       -10.1       15.8       -16.1       -40.4       41.0       20       -15         191.9       2.47       11.3       -14.1       9.3       -10.1       15.8       -19.1       -33.2       26.4       38       -51	00001	327.7	18	10.5	.53	20.9	I	11.11	-9.4	a. 9	4.6-	-3, 1		-15	87	29	5
21.7       .71       25.3       -24.7       20.5       -17.3       20.2       -21.7       -55.3       57.7       -2       5         28.4       .76       25.9       -25.6       20.5       -18.6       20.5       -22.6       52.6       -25.4       57.7       2       2         42.3       .98       .25.9       -25.6       20.5       -19.5       19.2       20.7       -62.4       59.       5       0         98.7       1.27       22.6       -21.9       20.1       -15.7       16.2       17.9       -52.6       51.9       9       -4         191.9       2.47       11.3       -14.1       9.3       -10.1       15.8       -15.1       -13.7       26.4       38       -51         191.9       2.47       11.3       -14.1       9.3       -10.1       15.8       -19.1       -13.7       26.4       38       -51	12000	451.b	14	14.6	13:	22.7	-	- <u>-</u>		15	16.5	-44.4	73,	-10	2	34	~
28.4       .75       25.9       -25.6       20.5       -18.6       20.5       -22.6       -59.4       57.7       2       2         42.3       .98       25.9       -25.4       20.5       -19.5       19.2       -20.1       -62.4       59.       5       0         64.9       1,27       22.6       -21.9       20.1       -15.7       16.2       +17.9       -52.6       51.9       9       -4         98.7       1,70       18.2       -17.3       17.2       -10.1       14.8       -16.6       -40.4       41.6       20       -15         191.9       2.47       11.3       -14.3       9.3       -10.1       15.8       -19.1       -33.2       26.4       38       -51	14000	636.6	,	21.7	12.	25.3	T — —		-17.3	20.2	-21.7	-55.3	-	-2	ű	0,7	6
42.3       .98       25.4       26.5       -19.5       19.2       -20.7       -62.4       59.       5       0         64.9       1.27       22.6       -21.9       20.0       -15.7       16.2       +17.9       -52.6       51.9       9       -4         98.7       1.70       18.2       -17.3       17.2       -10.1       14.8       -16.6       -40.4       41.6       20       -15         191.9       2.47       11.3       -14.3       9.7       -10.1       15.8       -19.1       -33.2       26.4       38       -51	00951	772.5	~	28.4	.76	25.9		[	-18.6	20.5	-22.6	-59.4	<del></del>	2	2	75	2
98.7 1.20 18.2 -12.9 20.3 -15.7 16.2 17.9 -52.6 51.9 9 -4 98.7 1.70 18.2 -17.3 17.2 -10.1 14.8 16.6 -40.4 41.0 20 -15 191.9 2.47 11.3 -14.3 9.3 -10.1 15.8 19.1 -33.2 26.4 38 -51	14000	958.9	8	42.3	.93	25.9		$\Box$	-19.5	19.2	-20. :	-62.4		~	0	7,7	12
98.7 1.70 18.3 -17.3 17.2 -10.1 14.8 16.6 -40.4 41.0 20 -15 191.9 2.47 11.3 -14.3 9.3 -10.1 15.8 -19.1 -33.2 26.4 38 -51	12000	1116.5	91	6.49	17.21	22.6	1 –		-15.7	16.2	17.9	-52.6	2	6	7	88	12
191.9 2 47 11.3 -14.3 9.3 -30.1 15.8 59.1 -33.2 26.4 38 -51	$\neg \neg$	1209.5	26	7'86	1.70	2.8	ī	Г	-10. i	14.8	9.91-	-40.4	41.6	22	57	39	=
	$\neg$	1270.	5.4	6.161	2.47	11.3	-14.3		10.1	15.8	19.1	-33.2		88	-51	62	2
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								<del>                                     </del>								†- 	
	-						-									$\dagger$	

Table A-8 M109 howitzer, 155mm, firing M549

		Basic Proje	iic Projectile: M549,	19, Puze M557			ŀ	Charge: Also	Š	IG (208.8 m/s) rently Used fo	a for S	he11:				
	Som														Brore Frrore	100
2	Resto	Elev. Corr.	Azimuth Corrections	rections			i	Pange	Range Corrections (meters)	ns (meter	3				1	
5.2	E10V.	1 m/1	Drift	Cross-Wind	Muzzle Velocity l meter/sec	elocity r/sec	Range-Wind 1 knot		A.r Temperature Na	rature	Air Density 16	ısıty	Proj. Wt.		Range	<u>.</u>
		meters	nils	mils	Dec	Inc	Head Tail	Tail	ĕ	Inc	Sec	Inc	Dec	Inc	Beters	meters
1000	· <del> </del>	1	1.5	7C.	10.1	-8.8	1.			٥	2	.2	-12	23	~	٥
2000	2.69.2	_	3.5	60.	19.6	-17.1	5:	77:-	0	0	6:-	6.	-24	24	6	-
300	411.4		6.4	.15	28.7	-25.2	1.0	6:-	0	٥	-2.0	2.0	-34	34	14	-
000	753.6		15.1	. 24	33.9	-32.9	1.9	-1.7	0	-	-3.7	3.6	-42	42	21	2
٤	0,41		46.4	- 55	28.2	-24.7	2.0	٥. ١	0	0	-2.6	2.7	- F	17.	15	~
	1305		115.8	1.09	21.3	-20.4	v.	5	0	0	-1.1	1	.21	7.7	27	-
, TI									   							
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STRIM		SURPLINE (01) 2/08 Dec 75				   										

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Table A-8 (continued)

		d 0.4.2	C Projectile: MS4	M549, Fuze M557				8	Charge:	26 (236.2 =/s)	(s/=					
<u> </u>	S	Source: FT 155-AL-0	N0		İ		1		7.180 Cur	Also Currently Used for Shell:	ed for	Shell:				1 1
a.	Besic	Elev. Corr.	Azimuth Corrections	rections				Range	Correcti	Range Corrections (meters)	rs)				Prob. 1	Errors
Range	Elev.	1 mil	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle 1	Muzzle Velocity I meter/sec	Range-Wind 1 knot		hir Temperature	verature	Air Censity	1	Proj. Wt.	of 150	Range	bef1.
Meters	m11s	aeters	mils	mils	ĕ	Inc	Head	Tail	i Š	Inc	ğ	Inc	) Dec	Inc	Deters	meters
1000	91.9	11	1.1	70.	8.8	-7.8	-:	7.	င	0	2	,2	-15	15	4	
2000	191.5	6	2.6	80.	17.2	-15.3	4.	4	0		6	6.	-29	29	80	٦
3000	305.3	*	4.4	.13	25.2	-22.4	6.	8.	0	o	-2.0	2.0	-41	42	13	-
0v07	448.7	۰	7.0	.13	32.8	-29.3	1.7	-1.4	0	0	3.5	3.6	-52	53	1.8	2
2000	764.1	2	15.3	.25	37.1	-35.9	2.7	-2.4	0	0	-5.7	5.6	-61	62	25	_
7000	1120.3	9	38.9	.55	32.2	9.82-	2.9	-1.7	0	0	4.6	4.7	87-	67	20	4
3000	1259.8	6	78.1	÷6-	24.6	-22.0	1.9	9	0	0	-2.6	2.9	-35	37	17	4
2523	1310.0	01	126.0	1.2,	21.7	-20.9	٦.	9	0	0	2.0	1.7	-30	31	14	4
															-	
														_		
M-MAN-F	(at) 21	SUMPL-7R (UT) 2700 Dec 75						1				1			ĺ	

Table A-8 (continued)

		Basic P	Projectile: M549	MS49, Fuze MS37			ı	ť	Charge3	30 (274.3	1/s)					1
	Sour	Source: FT 155-	55-AL-0				1		Also Cur	Also Currently Used for Shell:	ed for	Shell: .				ı
Sasic		Elev. Corr.	Azimuth Corrections	rections		 		Pange	Correction	Nange Corrections (meters)	(8)				Prob. 1	Errors
Range	Elev.	1 mil	Ur'ft Corr. to Left	Crosswind	Muzzle 'elocity l meter/sec	relocity tr/sec	Range-Wind 1 knot	-Wind	Air Temperature	erature	Air 5e	tensit/	Proj. Wt.	. of 1 <u>Sq</u>	Range	Defil.
Meters	mils	meters	m118	H. 18	ä	Inc	Head	Tail	ě	Inc	Dec	Inc	Dec	Inc	meters	meters
1	67.9	14	۲.	.03	7.5	8.9-	٠.	-:1	0	0	2	.2	-14	15	4	0
2000	140.4	13	1.8	.07	14.7	-13.3	.3	3	٥	0	6'-	6.	-27	28	2	1
3000	219.7	71	2.9	13.	21.5	-19.5	ж.	7	0	٥	-2.0	2.0	-39	277	11	н
4000	309.5	10	4.4	.15	28.0	-25.4	1.4	-1.2	0	0	-2.5	3.5	05-	ĸ	15	2
2000	418.0	80	6.3	.19	34.2	-31.1	2.2	6	0	0	-5.4	5.5	-59	19	20	2
0009	572.5	2	9.6	25	40.1	-36.6	3.4	-2.8	0	0	-7.8	8.0	-68	69	56	3
6500	758.6	2	14.9	30	40.7	-39.3	3.7	-3.	0	٥	-9.3	9,6	-71	72	cε	7
9 0009	8.766	5	25.4	97.	39.9	-36.n	4.5	-3.8	0	0	-9.2	9.2	79-	99	56	7
5000	1146.7	8	41.8	.62	33.5	-30.3	4.1	-2.5	0	0	-7.3	7.4	-53	55	23	S
4000	1753.0	11	68.6	06.	27.1	-24.6	3.1	-1.0	0	0	-5.1	5.3	-42	75,	۲۲	S
31.21	1325.0	13	136.5	1.34	22.3	-21.5	1.2	-1.0	ú	0	-3.5	2.3	-31	33	14	S
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Table A-8 (continued)

		Baste P	ic Projectile: N549,	9, Fuse MS57			,	f	Churge	5G (3/0.3 m/s)	(s/w					,
<b>-</b> -	Souc	Source: FT 155-A	55-At0			Ì	ı		Also Curz	Also Currently Used for Shell:	d for :	inell:				
2	Basic	Liev Corr.	Azimuth Corn	Corr Pot 1008				Range	Range Corrections (meters)	ns (meter	(8)				Prob. E	Errors
e6u <b>₹</b> 6	Elev.	, E	Srift Corr. to Late	Cross-41nd 1 knot	Muzzle V I mete	Muzzle Velocity I meter/sec	Range-Wind 1 knot	wind	Air Temperature 18	rature	Air Density	nsity	Proj. Jr.	of 15g	Range	۲) ۵
Meters	mils	a cer.	mils	mı lıs	ρec	Inc	Head Tail	Tail	Ω•c	SPC	ů	Inc	Ş	Inc	meter	Meters
000:	3.8.6	54	5.	90.	5.1	6.4-	.2	3	0	5	6	9.	-12	12	٥	0
2002	81.7	22	1.3	.12	8.6	-8.6	6.	-1.4	1.3	-3.2	-1.8	1.8	-19	19	,	
3000	125.7	20	2.0	91.	11.0	-11.2	2.4	6.7-	5.0	-7.2	-3.3	3.1	-23	23	8	
0007	179 ::	19	2::2	. 20	13.1	-13.2	4.3	-4.6	5.6	-11.5	6.4-	68	-25	26	10	2
3006	234.2	17	3.6	£2:	15.1	-15.1	4.4	-6.3	14.6	-15.6	-7.0	6.9	-27	88	13	7
56.40	254.3	16	4.5	. 26	17.2	-17.0	8.5	-7.9	18.9	-19.3	-9.4	9.3	-29	53	91 91	6
36% 	364.8	14	5.7	62.	19.4	-18.9	10.5	-9.5	22.6	-22.4	-12.2	12.3	-30	31	61	
00v2	641.0	11	7.2	.33	21.9	-21.0	77.7	-11.0	25.5	-25.1	-15.5	15.6	-30	3%	24	4
3000	542.8	88	9.4	88.	24.6	-23.4	14.1	-12.4	27.6	-27.1	-19.2	19.5	-31	33	28	4
10000	753.1	3	15.6	5++	27.1	-26.1	14.3	-13.6	28.0	-28.4	-23.5	22.9	-32	34	34	5
6006	1030.8	8	30.8	99.	26.3	-25.0	13.8	-10.7	24.2	-23.0	-22.6	22.4	-33	32	33	7
8000	1129.5	12	2.14	6	23.8	-22.5	12.2	-9.1	21.2	-20.3	-19.8	19.7	-27	58	52	
7000	1205.5	15	54.5	50.	21.1	-19.8	10.6	6.9-	18.5	-17.9	-16.8	16.9	-23	24	25	7
9009	1258.9	17	76.6	1.20	18.1	-17.0	9.0	-5.2	16.2	-15.7	-13.4	13.8	-18	ě;	20	8
30:30	1321.8	21	129.5	1.62	14.9	-13.9	6.5	-5.2	14.3	-14.1	-10.6	10.1	-10	10	18	^
4707	1375.0	22	149.4	1.82	14.2	-13.5	5.8	-5.2	13.1	14.0	-10.6	9.1	-7	^	18	,
SKRAL	7 (01) 7	SKRWLTK (OT) 2/66 Dec 75	#				 									

Table A-8 (continued)

		Basic P	Basic Projectile: M549, Fuze M557	49, Fuze KSS	7			Į į	Charge: 3	3W (266.7 m/s)	ls/¤					
	Sou	Source: FT 135	155-AL-0				1		also Curi	also Currently Used for Shell:	d for s	hell: .				
1	Basic	Elev. Corr.	Azimuth Com	Corrections				Range	Range Corrections (metcrs)	ns (metc)	:8)				Frob 2	Crrors
Rengs	21•7.	i mil	Drift Corr. to Left	Cross-Mind 1 knot	Muzzle Verocity I meter/sec	e ocity	Range-Wird 1 knot	Wird	Air Trap	Triperature 18	Air Density 18	nsity	Proj. Wt.	. of 189 Std.	9fru <b>97</b> ;	Defi.
Faters	#11s	meters	mils	mils	Dec	Inc	Head	5411	Dec	Inc	Dec	Inc	Dec	Inc	netern	arters
1000	71.9	14	8.	\$0*	7.8	-7.0	.1	1	0	0	-,2	.2	-13	14	4	Ð
2000	148.8	1,2	1.9	.07	15.1	-,3.6	~:	-:	ں	0	6	6.	-25	56	J.C	<b></b> 1
3000	233.3	11	3.2	11.	22.2	-27.0		17.	0	0	-2.C	2.0	-36	37	15	1
4000	330.3	6	4.7	.15	28.9	-25.1	1.4	-1.2	0	0	-3.5	3.5	-46	27	20	۲,
5003	451.0	7	6.9	.20	35.3	-32.C	2.3	6-1-	G	o	4.6-	5.5	<del>7</del> 5-	55	56	2
9009	649.3	2	11.6	. 28	39.5	-37.5	3.8	6:3	0	0	-7.9	8.2	-61	63	32	2
6100	689.3	3	12.7	62.	٤.	-38.4	8.5	0.0-	0	0	-8.2	8.6	-62	63	32	7
8009	916.8	3	21.8	14.	39.5	-37.1	3.9	-3.7	0	0	8.8	8.8	-59	61	34	3
2005	1114.6	,	37.6	75.	34.6	-31.2	0.4	8	0	0	-7.1	7.2	67-	51	28	3
4000	1233.6	10	61.5	.82	28.0	-25.3	3.2	8	0	0	-5.0	5.3	-39	70	22	4
3032	1320.0	12	130.9	1.27	22.3	-21.5	1.2	8	O	٥	-3.4	2.8	-28	29	18	7
	_															
SARPA	<b>rk</b> (01) 2	SURPL-PK (OT) 2/168 Dec 75														

Table A-8 (continued)

<u>_</u> _		Basic P	in Projectile: M549,	19, Fuze M557				8	charge:	5W (370.3 m/s)	(s/w)					
	Sou	Source: FT 155-	155-AL-0				1		Also Curi	Also Currently Used	for	Shell:				
å	Besic	Elev. Corr.	Azamuch Cor	Corrections				Range	Corrections	ons (meters)	rs)				Prob.	Errors
далде	Elev.	l mál	Prift Corr. to Left	Cross-Wind 1 knot	fuzzle V A mete	Huzzle Velocity A meter/sec	Range-Wind 1 knot	re-wind knot	Air Temp	Temperature 13	Air	Density 14	Proj. Wt.	. of 182	Range	ij
Meters	mils.	meters	mils	mils	Dec	Inc	Hea.	7411	Lec L	Inc	ĕ	Inc	ů Č	Inc	meters	metors
1000	38.6	24	٠.	90	5.1	6.4	.2	3	0	s	ا بو	9.	-10	70	\$	0
2000	81.7	22	1.3	.12	8.6	-8.6	6.	٦,٠٠	1.3	-3.2	-1.8	1.8	-16	97	80	~
3000	128.7	20	2.0	91.	11.0	-11.2	2.4	-2.9	5.0	-7.2	-3.3	3.1	-19	61	0.7	7
7000	179.4	18	2.7	. 20	13.1	-13.2	4.3	9.4-	9.7	-11.5	6.4-	4.8	-20	21	12	-
2000	234.2	17	3.6	.23	1.2.1	-15.1	7.9	-6.3	14.6	-15.6	-7.0	6.9	-22	22	15	2
0009	294.3	16	5.4	.26	17.2	-17.6	8.5	5.4-	18.9	-19.3	4.6-	9.3	-22	23	1.8	2
7000	361.8	14	5.7	.29	19.4	-18.9	10.5	-9.5	22.6	-22.4	-12.2	12.3	-22	23	21	2
8000	441.0	11	7.2	.33	21.9	-21.0	12.4	-11.0	25.5	-25.1	-15.5	15.6	-22	23	26	6)
0006	542.8	8	9.4	.38	24.6	-23.4	14.1	-12.4	27.6	-27.1	-19.2	19.5	-23	23	31	3
10000	753.1	3	9.6.	.45	27.1	-26.1	14.3	-13.6	28.0	-28.4	-23.5	6.52	-27	77	37	7
0006	1030.8	3	30.8	99.	2K.3	-25.0	13.8	10.7	24.2	-23.0	-22.5	22.4	-21	22	35	۰
8000	1129.5	12	41.2	62.	23.8	-22.5	12.2	-9.1	21.2	-29.3	-19.8	19.7	-19	20	31	6
7000	1205.5	15	54.5	.95	21.1	-19.8	10.6	6.9-	18.5	-17.9	-16.8	16.9	-16	16	27	9
9009	1268.9	17	76.6	1.20	18.1	-17.0	9.0	-5.2	16.2	-15.7	-13.4	13.8	-12	12	22	9
2000	1321.8	21	129.5	1.82	14.9	-13.9	6.5	-5.2	14.3	-14.1	9.01-	10.1	7-	5	19	٠,
4707	1335.0	22	149.4	1.82	14.2	-13.5	5.8	-5.2	14.1	-14.0	-10.6	9.1	-2	2	19	5
	,	;														
SAUPI - P.	נ (סג) לא	SAUPL-PR (OT) 2766 Dec 75														

Table A-8 (continued)

		Basic P	Projectile: MS49, Fuze M557	19. Euze M55/			ļ	Cha	Charge: 5W (461,8 m/s)	(461.8	(8/1					į
	Sou	Source: FT 155-1	55-AL-0				ļ	-	Also Curr	Also Currently Used for Shell:	d for 5	hell: _				ı
3	Basic	Elev. Corr.	Azimuth Corrections	rections				- fange	Hange Corrections (meters)	ns (meter	6				Prob. E	Errors
Я <b>а</b> лае	Elev.	l mil	Drift Corr. to Left	Cross-Wind	Muzzle Velocity I meter/sec	elocity r/sec	Range-Wind 1 knot	Wind	Air Temperature	rature	Air Density 10	sity	Proj. Wt.	. of 189	Range	Def1.
Meters	mils	meters	mils	S[TE	Dec	Inc	Head	_a11	500	Inc	Dec	Inc	Dec	Inc	meters	Leters
2000	32.5	34	1.2	00.	8.1	-7.7	7.	4	9:-	.3	-2.2	2.2	-21	2.7	6	-
0007	120.0	26	2.9	.22	14.4	-13.9	1.7	-1.6	-1.1	.2	-8.2	8.2	-32	33	12	7
6000	205 7	7.1	-4	.32	18.3	-18.0	4.7	-4.3	2.9	-5.1	-14.7	14.0	-35	36	15	2
9008	308.7	81	7.0	07.	20.9	-20.6	0.6	6.5-	11.6	-13.1	-20.6	20.0	-34	36	18	<u>س</u>
10000	436.2	14	9.6	74.	23.5	-23.0	13.6	-11.6	19.7	-20.1	-27.8	27.8	-31	33	21	m
12000	632.2	7	15.5	75.	27.0	-26.1	17.5	-15.2	24.5	-25.0	-37.4	38.5	-26	28	26	5
12530	745.6	2	19.8	.62	27.5	-27.0	17.5	-16.1	24.6	-25.8	-40.2	39.3	-24	27	56	n
12000	957.4	7	32.1	64.	27.6	-26.8	17.5	-15.8	23.2	-23.2	-42.0	40.5	-22	25	28	s
10000	1138 5	31	51.1	1.04	23.7	-22.7	16.2	-13.1	18.7	-19.1	, j	34.2	81-	22	57	7
8000	1250.4	21	85.9	1.43	19.0	-18.1	13.6	-7.9	15.3	-15.8	-26.4	26.5	-11	14	19	^
6045	1330.0	30	191.7	2 24	13.6	-13.0	9.2	-7.9	13.7	-14.2	-21.0	17.5	7	ار.	3.6	7
	_															
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T MARKS	5100 July 1110 2/168										]					

Table A-8 (continued)

		Basic P	Projectile: MS	M549, Fuze M557	7.			<b>5</b>	Charge: 6	. RA (461.8 m/s)	(s/m 8.					
	Sou	Source: FT 155	155-AL-0				1		Also Curr	Also Currently Used for Shell:	ed for 5	hell:				
2	Basic	Elev. Corr.	Azımuth Corr	Corrections				Range	Range Corrections	ns (meters)	rs)				Prob. E	Errors
Range	Elev.	1 = 1	Drift Corr, to Left	Cross-Wind 1 knot	Muzzle Velocity l meter/sec	elocity r/sec	Range-Wind 1 knot	re-Wind knot	Air Temperature	erature	Air De	Density 11	Proj. Wt.	of 31	Range	Def1.
Meters	B118	meters	7118	mils	ĕ	Inc	Head	Tall	Sec.	Inc	Dec.	Inc	Sec	Inc	meters	meters
2000	52.2	34	6.	01.	8.2	-7.7	7.	4	4	.3	-2.1	2.1	-21	22	6	1
0007	116.0	32	2.4	.15	15.9	-14.9	1.4	-1.3	-1.3	6.	-8.0	8.3	-36	37	14	1
9009	177.1	32	3.8	.14	22.5	-21.6	2.9	-2.9	-3.1	1.6	-16.8	17.3	-52	54	24	2
9000	243.6	2.7	5.4	.18	25.8	-25.4	5.5	-5.3	-5.3	1.9	-27.4	27.8	-59	61	33	3
10000	324.2	23	7.0	77.	27.6	-27.5	9.3	-8.6	-4.1	-2.6	-38.1	36.3	-61	62	17	7
12000	421.2	61	6.8	.29	28.5	-28.8	14.3	-12.7	3.2	-10.9	4.6.4	43.3	-61	63	87	5
14,000	539.6	15	11.7	.33	9.82	-29.5	20.1	-17.3	13.4	-20.6	-53.6	50.7	-58	9	54	9
16000	708.2	80	15.0	.35	27.8	-29.6	24.3	-22.1	22.1	-29.6	-67.0	61.4	-53	55	62	80
16700	861.6		19.7	.36	26.9	-29.3	24.3	-23.7	23.4	-32.5	6'59-	61.4	67-	52	62	8
16000	1,018.2	01	27.1	.39	24.2	-24.7	24.3	-19.9	24.2	-33.9	-65.8	62.2	-47	67	7.3	1.1
14000	1155.9	50	38.3	.43	7.61	-20.5	23.1	-15.3	22.1	-30.3	-56.7	54.1	-42	777	67	12
12000	1243.4	56	51.7	.55	1.91	.16.7	16.6	-10.4	19.5	-26.3	-47.3	45.4	-35	37	09	13
10000	1311.8	33	75.3	59.	12.3	-12.7	12.0	-5.4	17.0	-22.8	-37.3	36.3	-24	27	52	13
7996	1305.0	77	140.2	1.05	7.4	-8.0	5.7	-5.4	15.5	-20.7	-32.8	26.1	7-	9	52	13
SKRPA-P	1	SKRPK-PIT (CT) 2/68 Dec 15				]							] 			

Table A-8 (continued)

		Besto FT 19	: Projectile: M54 55-AL-0	M549, Fuze M557			i	er C	Charge: /# (Jobb) 3135/ Also Currently Used for	ently Use		Shell:				
	: somos								-	-					40.5	Frrors
Basic		Zlev. Corr.	Azimuth Cor	Corrections				Range	Range Corrections (meters)	ns (mete)	(3)				- 1	1017
Range E1	E13V.	1 mil	Drift Corr. to Left	Cross-Wind 1 kno:	Muzzle Velo 1ty 1 meter/sec	elo aty r/sec	Range-Wind 1 knot	Wind tot	Air Tempe	Temperature 14	Air Der	Density ]•	Proj. Wt.	of 189 Std.	Range	
-	1		ei is	mils	1.	Inc	Head	7811	[ Fec	Inc	Dec	Inc	Dec	Inc	meters	meters
3000	2	5.5	30.	.0.	6.8	-6.5	.3	3	,	7.	-1.9	1.9	-19	20	11	-
0007	28	41	2.1	.16	12.5	-12.5	7.7	0.1-	-1.5		-7.3	7.5	-30	31	12	-
╁	13.7 B	3.2	3.7	.25	17.1	-16.5	2.6	-2.4	-3.2	2.7	-15.8	16.5	-33	34	51	2
+-	303 1	*	5.6	.35	20.7	-70.1	5.1	-4.5	-3.8	1:3	-26.4	26.0	- 30	31	20	ſ
+	290.0	12	7.9	4-7	23.1	-22.7	9.0	7.7-	1.5	8-7-	.35.2	33.6	-26	88	24	~
+	- 2	12	10.6	.52	25.0	-24.6	13.7	-11.4	10.5	-12.4	-47.8	41.5	-21	5.4	28	-1
+-	538.3		14.4	69.	27.2	-26.6	18.5	-15.4	18.4	-18.8	-51.5	52.3	-14	17	32	٠٠.
╁╌	663	7	17.9	.65	26.8	-28.0	20.8	-17.4	6.61	-20.8	-57.2	8.65	6-	12	35	۵
+	1 1 1 1 1 1 1		21.8	02.	29.3	-28.8	20.8	-18.4	20.2	-21.4	-60.9	8.65	<b>5</b> -	6	35	√C
+	6.74	, ,	33.8	88	29.4	-28.8	20.8	. 2n.1	18.	-19.6	-65.8	59.8	-5	ę.	39	8
0007	1039 0	,   [	42.7	66.	27.9	-27.2	2:.4	-19.1	16.9	-18.1	-61.7	8.65	-2	ব	36	8
+-	8 6511	02	61.7	1.24	24.3	-23.5	15.9	-15.6	14.2	-15.4	-52.4	51.6	2	2	31	ĵ
+	1246.4	26	92.9	19.7	20.1	-19.3	17.8	-12.7	12.2	-13.3	-42.3	42.3	7	7-	26	٥.
╁	1312.3	\ \	182.1	2.41	15.0	-15.8	13.9	-12.7	11.5	-12.7	-35.0	31.2	13	-24	23	٥
+-	1320.0	38	199.4	2.61	14.3	-15.5	13.2	-12.7	11.5	-12.8	-35.0	29.8	19	-27	2	3.
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Table A-8 (continued)

			Basic P	Projectile MS	MS49, Fuze MS57				ا گ <sup>و</sup> ا	charge:	RA (560.8	(7, 6					
Picolar   Pico		Sou	FT 15	-AL-0				1			ently Use	Į.	hell: _				
13.10         Diritte corr. 30 card         Crossa-Mind of Market vision of the series         Annotation	2	110	Elev. Corr.	Azamuth Cor	rections				af us <sub>b</sub>	Correctio		- F				1	rzors
412.         meters         mils         pril         peed         Tail         Dec         Tail         Tail </th <th>Range</th> <th>Elev.</th> <th>I m I</th> <th></th> <th>Cross-Wind</th> <th>Muzzle V 1 mete</th> <th>elocity r/sec</th> <th>Range 1 kr</th> <th>Mind</th> <th></th> <th>rature</th> <th>Air De</th> <th>naity</th> <th>Proj. Wt</th> <th>of I std</th> <th>Range</th> <th>Def1.</th>	Range	Elev.	I m I		Cross-Wind	Muzzle V 1 mete	elocity r/sec	Range 1 kr	Mind		rature	Air De	naity	Proj. Wt	of I std	Range	Def1.
35.0         52. <th>in the second</th> <th>17.7</th> <th>meters</th> <th></th> <th>m2.1s</th> <th>Dec</th> <th>Inc</th> <th></th> <th>Tail</th> <th>يق</th> <th>Inc</th> <th>Dec</th> <th>Inc</th> <th>o<b>a</b>c</th> <th>Inc</th> <th>meters</th> <th>meters</th>	in the second	17.7	meters		m2.1s	Dec	Inc		Tail	يق	Inc	Dec	Inc	o <b>a</b> c	Inc	meters	meters
77.9         44         2.0         1.1         1.0         -1.0	2000	35.0	<u>L</u> _	80.	.07	6.9		.3	£	4	7.	-1.9	1.9	-19	20	11	-1
127.1         46         3.3         .14         19.0         -18.2         2.1         -2.0         -3.5         2.1         -15.0         -3.5         2.1         -15.0         -3.5         2.1         -15.0         -3.5         2.1         -2.0         -3.5         -3.6         -2.6         -3.7         -3.	0007	77.9		2.0	.14	12.8	-12.2	1.0	-1.0	-1.6	1.3	4.5-	7.6	-31	32	13	2
167.5         41         4.7         1.1         22.9         -22.7         3.9         -3.6         -3.6         -3.6         -3.6         -3.6         -3.6         -3.6         -3.7         -3.7         -3.6         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3.7         -3	9009	122.1		3.3	.14	19.0	-18.2	2.1	0.2	-3.5	3.1	-15.9	16.5	-77	57	28	3
220.8         34         6.3         -24.7         6.4         -5.7         -9.0         7.9         -39.5         40.3         -51         53         41           280.9         27         81         -24.7         6.4         -10.9         7.6         -32.1         52.1         -47         49         49           360.0         27         81         -26.6         9.7         -8.4         -10.9         7.6         -6.0         -4         49	8000	167.5		4.7	71.	22.9	-22.2	3.9	-3.6	-6.1	2.4		27.4	-51	53	37	-7
286.9         27         8.1         -2.6.6         9.7         -8.2         -10.9         7.6         -52.1         5.2         -27         -8.2         -10.9         7.6         -52.1         5.2         -27         -8.2         -10.9         7.6         -52.1         5.2         -4.6         9.7         -8.2         -10.9         7.6         -6.6         -6.6         61.6         -6.4         46         5.9         45           465.0         19         12.7         -27         13.7         -13.7         -13.7         -6.3         -6.1         -7.9         -6.2         -6.1         -7.7         -7.9         -6.2         -6.1         -7.7         -7.9         -6.2         -6.1         -7.7         -7.9         -6.2         -6.1         -7.7         -7.9         -6.2         -6.1         -7.9         -7.9         -6.2         -6.1         -7.9	10000	220.8		6.3	.23	15.3	-24.7			0.6-	7.9	-38.5	40.3	-51	53	4.5	2
367.0         23         10.2         13.7         28.7         11.7         -8.0         5.1         -64.0         61.6         -44.         465         55           465.0         19         12.7         .42         33.1         -28.7         18.9         -15.5         -6.6         -3.7         -73.9         70.3         -44         46         55           586.8         14         16.0         .47         31.4         -31.0         24.9         -19.8         10.2         -11.3         -82.3         20.4         -39         42         66           666.0         11         18.9         .47         31.4         -31.0         24.9         -19.8         10.2         -11.3         -82.3         20.4         -39         42         69           819.6         4         23.8         .52         31.2         -24.5         16.1         15.6         -97.0         91.2         -36         78           1101.3         19         42.7         35.2         32.1         22.2         22.1         15.6         11.6         -97.0         91.2         -36         92         -37         92         11.6         -97.0         91.2         -36	12000	286.9		8.1	.30	27.1	-16.6	9.7		-10.9	7.6	-52.1	52.1	-47	67	57	9
465.0         19         12.7         .42         30.1         -29.7         18.5        6         -3.7         -73.9         70.3         -41         44         62           386.8         14         16.0         .47         31.4         -31.0         24.9         -19.8         10.2         -11.3         -82.3         80.4         -39         42         '69           666.0         11         18.3         .49         31.2         -31.7         27.2         -22.0         15.5         -14.6         -86.5         88.1         -39         42         '69           819.6         4         23.8         .52         31.2         -31.7         27.2         -22.0         15.5         -14.6         -86.5         88.1         -39         78           1039.8         14         36.8         .52         31.2         -37.7         27.2         -22.7         16.1         -95.0         91.2         -16         97.0         91.2         -16         97.0         91.2         -16         97.0         91.2         -16         97.0         91.2         -17         92.0         91.2         -17         92.0         91.2         -17         92.0         91.2 </th <th>14000</th> <th>367.0</th> <th></th> <th>10.2</th> <th>78.</th> <th>28.7</th> <th>-28.2</th> <th>13.9</th> <th>-11.7</th> <th>0.8-</th> <th>5.1</th> <th>-64.0</th> <th>61.6</th> <th>77-</th> <th>4.6</th> <th>\$5.</th> <th></th>	14000	367.0		10.2	78.	28.7	-28.2	13.9	-11.7	0.8-	5.1	-64.0	61.6	77-	4.6	\$5.	
586.8         14         16.0         .47         31.4         -31.0         24.9         10.2         -11.3         -82.3         89.4         -59         42         76           666.0         11         18.3         .49         31.2         -31.7         27.2         -22.0         15.5         -14.6         -86.5         88.1         -38         41         72           819.6         4         23.8         .52         33.2         -31.7         27.2         -24.5         16.1         -16.6         -97.0         91.2         -36         39         78           1039.8         14         36.8         .03         32.6         -32.1         27.2         -22.7         9.2         -11.6         -99.6         94.0         -36         39         78           1101.3         19         42.7         .67         31.2         -21.1         27.2         -22.7         9.2         -11.6         -99.6         94.0         -36         39         78           1101.3         19         42.7         .67         31.2         -21.6         21.6         -10.0         -95.0         91.4         -36         40         87           1188.5	16000	465.0		12.7	.42	13.1	-29.7		-13.5	9	-3.7	-73.9	70.3	-41	44	62	6
666.0         11         18.3         .49         37.2         -31.7         27.2         -22.0         15.5         14.6         -86.5         88.1         -38         41         72           819.6         4         21.8         .52         31.2         -37.7         27.2         -24.5         16.1         16.6         -97.0         91.2         -36         39         78           1039.8         14         36.8         .63         31.2         -37.7         27.2         -22.7         9.2         11.5         -99.6         91.2         -36         37         78           1101.3         19         42.7         .67         31.2         -30.6         26.4         -17.3         4.9         -7.8         -95.0         91.4         -36         40         87           1188.5         27         55.3         .77         27.9         27.4         27.0         -17.3         4.9         -7.8         -84.7         82.4         -35         40         85           1186.5         36         37         -27.4         27.0         17.3         4.9         -7.8         -84.7         82.4         -35         49         71           1	18000	586.8		16.0	74.	31.4	-31.0	24.9			-11.3	-82.3	89.4	-59	2.7	, 6a	=
819.6         4         23.8         .52         35         -37.7         27.2         -24.5         16.1         15.6         -97.0         91.2         -36         39         78           1039.8         14         36.8         .03         32.6         -37.1         27.2         -22.7         9.2         -11.5         -99.6         94.0         -36         40         87           1101.3         19         42.7         .67         31.2         -30.6         26.4         -21.0         7.6         10.0         -95.0         91.4         -36         40         87           1188.5         27         55.3         .77         27.9         -27.4         21.0         -17.3         4.9         -7.8         -84.2         82.4         -36         40         85           1254.3         34         73.4         .91         22.1         27.4         27.5         -17.3         4.9         -7.8         -84.2         82.4         -35         79         79           1254.3         34         73.4         .91         22.1         12.5         12.5         12.5         12.5         27.9         12.1         27.9         27.9         27.9	19000	666.0		18.3	67.	32.2	-31.7	27.2	-22.0		-14.6	-66.5	88.1	- 18	41	7.2	12
1039.8         14         36.8         .03         32.6         -37.1         27.2         -22.7         9.2         -11.5         -99.8         94.0         -36         40         87           1101.3         19         42.7         .67         31.2         -30.6         26.4         -7.10         -7.6         -10.0         -95.0         91.4         -36         40         85           1188.5         27         55.3         .77         27.9         -27.4         21.0         -17.3         4.9         -7.8         -84.7         82.4         -33         36         79           1254.3         34         73.4         .91         24.1         12.1         19.5         -17.5         17.3         -84.7         82.4         -33         36         79           1307.5         42         10.0         -17.3         4.9         -7.8         -84.7         82.4         -33         36         79           1307.5         42         10.5         -11.3         3.3         -5.8         -58.1         59.5         -10         14         77           1307.5         42         11.0         11.0         11.1         3.2         -58.1	20100	819.6		23.8	.52	35	-32.7	27.2	-24.5		-15.6	-97.0	91.2	-36	39	92,	14
1101.3         19         42.7         .67         31.2         -30.6         26.4         -21.0         7.6         10.0         -95.0         91.4         -36         40         85           1188.5         27         55.3         .77         27.9         -27.4         21.0         -17.3         4.9         -7.8         -84.2         82.4         -33         36         79           1254.3         34         73.4         .91         22.1         -27.4         17.5         17.5         -6.4         -71.9         71.7         -25         .9         71           1307.5         42         110.1         1.21         19.4         -18.4         15.4         -11.1         3.5         -5.8         -58.1         59.5         -10         4         67           1300.5         25         176.0         1.56         -11.1         3.5         -58.1         -88.2         -5         -5         -7         67	19000	1039.8		36.8	.e.	32.6	-32.1	27.2	-22.7		-11.5	3. 66-	0.76	-36	70	87	19
1188.5         27         55.3         .77         27.9         -27.4         21.0         -17.3         4.9         -7.8         -84.7         82.4         -33         36         79           1254.1         34         73.4         13.4         12.1         12.1         12.1         12.2         13.2         13.4         13.4         13.4         13.4         13.4         13.4         13.4         13.4         13.5         11.1         3.2         16.3         13.1         13.2         13.4         14.4         11.7         10.5         11.1         3.2         16.3         12.1         14.4         11.7         10.5         11.1         3.2         16.3         12.1         13.5         11.1         13.2         14.2         14.5         11.1	18000	1101.3		42.7	.67	31.2	-30.6	26.4	0.12-		-10.0	-95.0	93.4	-36	04	85	20
1254.3         34         73.4         .91         24.1         -23.4         19.5         -12.5         3.6         -6.4         -71.9         71.7         -25         .99         71           1307.5         42         110.1         1.21         19.4         -18.4         15.4         -11.1         3.3         -5.8         -58.1         59.5         -10         14         67           1340.0         52         176 0         1.56         -17.5         10.5         -11.1         3.2         -58.1         48.2         -5         -7         67	16000	1188.5			11.	27.9	-27.4	23.0	-17.3	6.4	-7.8	-84.7	82.4	-33	3%	6/	1.7
1307.5         42         110.1         1.21         19.4         -18.4         15.4         -11.1         3.3         -5.8         -58.1         59.5         -10         14         67           1340.0         52         175 0         1.56         16.4         -17.5         10.5         -11.1         3.2         -6.3         -58.1         48.2         -5         -7         67	14000	1254.3		73.4	16.	24.1	-23.4	19.5	-12.5	3.6	-6.4	-71.9	7.17	-25	6.7	7.1	21
1340.0 52 176 0 1.5h 14.4 -17.5 10.5 -11.1 3.5 1-6.3 -58.1 48.2 -5 -7 67	1 2000	1307.5		110.1	1.21	19. 4	-18.4	15.4	-11.1	3.3	-5.8	-58.1	59.5	-10	14	67	77
	1.04.86	1340.0			1.56	14.4	-17.5	10.5	-11.1	3.5	-6.3	-58.1	48.2	-5	-7	67	23

Table A-9 M109 howitzer, 155mm, firing M454

1.3   1.4   1.4   1.5   1.4   1.5				Basic Projectile:	XH454			 	Charte:	~   ë	rently Used	d for S	hell:				, ,
Siev.   Fig.   Siev. Corr.   Akanah Corrections   Siev.   Fig.   Siev.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Fig.   Siev.   Siev.   Fig.   Siev.		Sou	1						3,4000	orrection	ns (meter	· 6				Prob. E	rrors
The color of the	đ	0.19	Elev. Corr.		rections									Prot.	5	Range	Sef1.
10   10   10   10   10   10   10   10	Range	Slev.	l mil	Drift	Cross-Wind		elocity r/sec	PANGE-		ALE Tempé		11.	181.04	102	;		
913         No. 676         1.3         1.2         1.3         1.4         1.4         1.4         1.3         1.1         1.4         1.3         1.1         1.4				Corr. to Left	S TE		Inc		Tail	Dec Dec	inc	)3c	Inc	Š.	Inc	He Lak	
100.7   17   2.7   1.10   12.8   -11.1   1.6   -2.6   1.6   -1.0   -1.1   1.	Beters	1	-		7	5.6		. 3		7.	1	3	٤.	ř.			0
110.7   177   2.77   .116   12.85   .111   .15   .27.5   2.52   .19	1000	53.4	1		2		-	-	7	6	3	-1:1		-14	14		
143.0   15   4.4   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14.6   14.5   14	2000	110.7		2.7	<u>۲</u>	12.8			1		."	-2.5	2.5	- 19	19		
242.2         14         5.5         118         24.0         -20.7         2.1         1.1.4         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         1.5         -1.6         -1.7	3000	1,3.0		4.4	. 14	18.5	-15.0	,,,	20	<u> </u>			3	9.5	7.7		_
121.3   12   9.0   .22   29.2   -25.3   3.0   -2.2   1.9  8   -6.7   6.8   -86  5       416.7   9   12.4   .23   34.1   -29.6   6.2   -3.1   2.2  9   -9.4   9.1   -31   32   82       547.7   6   18.0   .35   36.3   -39.6   6.2   -3.1   2.2  9   -9.4   9.1   -31   32       694.1   3   23.6   .13   36.9   33.7   -35.3   6.4   -5.1   2.2   -1.0   13.1   5.5   -13   31       694.1   3   23.6   .13   36.9   38.7   -35.9   7.2   -6.4   1.7   -7   -16.1   5.5   -13   31       1121.5   10   64.5   .51   32.8   -7.5   7.3   -6.5   1.5   -6.5   1.4   18.7   -2       1214.9   12   39.6   1.19   22.0   -22.5   2.3   -6.5   1.2   -12   12.2   12.0   -18   18       1246.1   12   86.1   1.14   24.5   -20.9   3.3   -6.5   1.2   -12   12.2   12.0   -18   18       1246.1   12   86.1   1.14   24.5   -20.9   3.3   -6.5   1.2   -12   12.2   12.0   -18   18       1246.1   12   86.1   1.14   24.5   -20.9   3.3   -6.5   1.2   -12   12.2   12.0   -18   18       1246.1   12   86.1   1.14   24.5   -20.9   3.3   -6.5   1.2   -12   12.2   12.0   -18   18       1246.1   12   86.1   1.14   24.5   -20.9   3.3   -6.5   1.2   -2.5   -2.	6007	242.2	L	5.5	811.	24.0	-20.7	2.1	7.1-	5:2		;		; ;	۶		
446.7.         9         12.4         .23         34.7.         -29.6         6.7.         -9.4         9.6         -31         32         85           547.7         6         18.0         .13         34.7.         -4.2         2.2         -1.0         -12.7         17.1         -14         35         -6.6           547.7         6         18.0         .13         -13.9         5.7         -4.2         2.2         -1.0         -12.1         17.1         -14         35         -6.6         17.1         -12.7         17.1         -14         35         -6.6         17.1         -12.7         17.1         -14         35         -14	99	2 5	1_	9.0	:23	29.5	-25.3	3.0	-2.2	1.9	œ	19.1	_	87-	3		
446.7       9       12.4       5.7       -4.2       2.2       -1.0       -12.1       11.1       -14       35       5.5       2.5	2005		$\perp$	-	7,	34. :	-29.6	4.2	-3.1	2.2	6	4.6-		-31	35	3 1	7
547.7       6       18.0       .73       25.6       .73       15.3       6.4       -5.1       2.7      9       -15.1       15.5       -35       39       25.6         694.1       3       25.6       .73       -9       -5.1       2.7       -6       -15.1       15.7       -13       31       25         997.2       6       49.3       .6       38.7       -12.9       7.2       -6.6       1.7       -16.1       18.7       -2       -2       -16.1       18       25         1121.5       10       64.5       .6       7.3       -6.5       1.5       -16.1       18.2       25       26       26         1214.9       12       -7.5       7.3       -6.5       1.2       -5       -12.9       12       -5       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       12       -2       -12.9       -12       -12       -12       -12       -12       -12 <td< td=""><td>0009</td><td>416.</td><td>1</td><td>7.77</td><td>,</td><td>0 92</td><td>-13.9</td><td><u></u></td><td>-4.2</td><td>2.2</td><td>-1.0</td><td>1-12.7</td><td>_=_</td><td>- 34</td><td>35</td><td>4.71</td><td>7</td></td<>	0009	416.	1	7.77	,	0 92	-13.9	<u></u>	-4.2	2.2	-1.0	1-12.7	_=_	- 34	35	4.71	7
694.1       3       25.6       .13       34.3       -25.4       1.7       -17       -16.1       15.7       -21       31       \$\frac{1}{2}\$         997.2       6       49.3       .69       38.7       -12.9       7.2       -6.4       1.7       -16.1       15.7       -21       26         1121.5       10       64.5       .51       32.8       -7.5       7.3       -6.5       1.5       -16.6       14.3       -20       26         1214.9       12       79.6       1.19       27.0       -22.5       7.3       -6.5       1.2       -12.9       12.7       -10       18       18         1246.1       12       86.1       1.34       24.0       -20.9       7.3       -6.5       1.2       -12.2       12.0       -18       18         1246.1       12       86.1       1.34       24.0       -20.9       7.3       -6.5       1.5       -12.2       12.0       -18       18	7000	547.7		18.0	?			4	]-	2.2	6	-13.1	+-	- 35	3,	ылу	٠,
997.2 6 49.3 .69 38.7 -32.9 7.2 -6.6 11.7 -7.7 -10.0 25 1121.5 10 64.5 .61 32.8 -27.5 7.3 -6.5 11.5 -6.6 14.6 14.3 -25 26 1214.9 12 79.6 11.9 27.0 -22.5 7.3 -6.5 11.2 -5 -12.9 12.7 -20 20 1224.1 12 86.1 11.34 24.5 -20.9 7.3 -6.5 11.2 -5 -12.2 12.0 -18 18	7600	694.1		25.6	;;	24.5						1	ئال	-31	<u> </u>	TON	-3
1121.5 10 64.5 .;1 32.8 -27.9 7.3 -6.5 11.55 -12.9 12.7 -20 20 1214.9 12 79.6 11.9 27.0 -22.5 7.3 -6.5 1.25 -12.9 12.7 -20 20 124.9 12 86.1 11.34 24.5 -20.9 7.3 -6.5 1.25 -12.2 12.0 -18 18 1240.1 12 86.1 11.34 24.5 -20.9 7.3 -6.5 1.25 -12.2 12.0 -18 18	7007	997.2		49.3	69.	38.7	-32.9	7.2	÷,	 <u>-</u>				1	3,4		ļ. -
1214-9 12 79.6 1.19 27.0 -22.5 7.3 -5.1 1.3 -5 -12.9 12.7 -20 20 1224.1 12 85.1 1.34 24.5 -20.9 1.3 -5.5 1.25 -12.2 12.0 -18 18	0004	7		64.5	₹:	32.8		7.3	-5.5	S:-	٠-'	-		:	1 9	$\downarrow$	1
1246.1 12 86.1 1.34 24.0 -20.9 7.3 -6.5 1.25 -12.2 (2.0 -18 18	3	_	$\perp$	79.6	6; 1	27.0	-22.5	7.3	-6.5		s	-12.5		07-	€  -		
	900		1-	85.1	1.34	24.5	6.02-	<i>;</i> :	· ^ +		<u>~</u>	-12.2	12.0	ec	8.		<u>'</u>
	204	1	-			_			~			_	_	<u> </u>	-	4	
		-			-		-	-	\ <del>\</del> —	_			_			_	4
					-	1	  -  -	+	-	_	_	-	_		_		
	L				- 	-	-	_	  -		-	$\downarrow$	-	-	 	_	<u> </u>
		-				_	1	+	_	_	+	$\downarrow$	-	-	_	-	<del> </del>
		-	ļ ļ -						_			4	4	<u> </u>		1	}

Table A-9 (continued)

	Scui	dasic F Source: F7 135-	Projectile, 38454	750			 	Ğ	Also Curi	Charge: 2 (374.9 =/s) Also Currently Used for Shell:	(s) ed for :	Shell: ,				l
Ba	Basic	Elev. Corr.	Azimuth Corrections	rections				Rage	Correction	Rage Corrections (meters)	rs)				Frob. E	Errors
Range	Elev.	i m.1	Drift Corr. to Left	CrossWind	Muzzle	Muzzle Velocity 1 meter/sec	Range-Wind 1 knot	i	Air Temo	Temberature 1%	Air De	. Density	Proj. Wt.	. of 1 1b	Range	Defil.
Meters	mı 19	meters	mils	1; اد	o o	Inc	Head	.a.	Dec	Inc	Dec	Inc	Dec	Inc	meters	meters
0001	37.5	25	0;	80.	8.4	-4.4	7.	17	6'	ć*-	·	5.	-7	,		0
2000	29.0	ri	2.1	71.	3.8	12	7.	7:	3.4	-2.9	-1.7	1.7	-11-	11		0
3000	124.4	12	5.4	.17	. 11	7.01-	2.R	-2.2	6.6	-5.3	4.1	3.4	-14	15		
000:	£ 7/1	•	6.4	. 22	4.51	-12.8	4.5	-3.3	10.1	-1.7	-5.5	5.6	-12	17		_
5000	229.5	1.5	5.3	. 25	17.3	-15.0	5.2	6.61 4.2-	13.3	-10.0	-8.3	8.3	-18	61		1
9009	291.5	15	8.9	. 31	20.0	-17.1	9.1	-6.0 16.J	l6.3	-12.1	-11.4	9.11	-19	20		1
000_	363.2	13	11.5	. 36	2.55	-19.2	10.0	7.1-	18.8	-13.8	-15.0	15.3	-20	21	31	2
8000	450.3	01	15.1	15.	25.5	-21.4	0.51	.8.e	20.8	-15.2	-19.1	19.6	-20	21	IC/R	C4
0006	570.9	9	20.9	67.	28.6	-23.8	13.9	-10.3	22.0	-16.1	-23.1 24.7	24.7	-21	22	VPPI	7
96.1)0	7:0.3	3	28.9	. 58	29.4	-25.3	13.9	-11.	22.0	-16.3	-27.0	24.6	-21	22	TOM	3
0006	9.836		7.67	£8.	29.2	-24.3	13.9	-12.2	9.61	-13.9	-28.7	27.7	-18	19		3
8000	1077.3	11	52. i		25.8	-21.4	3,3	-11.7	17.6	-12.3	-26.6	25.8	-15	15		4
0062	1157.9	91	73.5	1.25	22.1	-19.4	0.61	-11.3	15.4	-10.9	-24.2	23.5	-12	٤,		7
0004	1226.3	15	85.1	1. 55	18.	-15.3	5.51	-10.9	13.4	-9.4	-21.7	21.1	6-	6		4
2:00	1245.3	16	88.8	1.96	17.6	-14.4	12.4	-10.8	12.8	-9.0	-20.9	20.3	۵ <sub>۲</sub>	6		4
				-												
SARPA-P	x (01) 21	SARPA-PR (OT) 2766 Dec 75											1			

Table A-9 (continued)

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Also Currently Used for strong freters)  1 knot			B1810	Basic Projectile: XX434	. 54			ļ	8	rge:	Charge: 1 (530.6 m/s)	્રે ક					
214° Corr.   Arinuth Corrections   Manage Corrections (reteen)		Sour	ļ	5-AJ-2						Also Cur	rently Us	ed for	Shel 1:				· 1
18.14   Drift   Corr to Left   Liknot	Ba	ite	Elev. Corr.		rections				lange	Correcta	ons (rete	rs)				Prob. Errors	Srors
35.8         49         .9         .09         '.0         -6.5         .2         -7         -7         -7.1           35.8         49         .9         .09         '.0         -6.5         .2         -7         -7         -7.1           33.3         38         2.9         .09         '.0         -12.9         1.0         -7.0         -2.8         2.4         -8.0           143.4         10         3.6         .29         .18         17.9         -12.9         1.0         -7.0         -2.8         2.4         -8.0           19.0         3.6         .29         .29         17.3         -16.7         2.9         -2.8         -1.2         -1.4         -17.4	Range	Elev.	1 1 1 1	Drift Corr to Left	Cross-Wind 1 knot	Fuzzle v	(e)001Ey	Pange 1 k	pe13-	ALE Temp	erature	Air De	ensity	Proj. Wt.	t. of 11b	Range	11. 12.
36.8         49         .9         .09         .10         -6.5         .2         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -7.7         -8.0           183.4         10         3.6         .29         17.3         -16.7         2.7         -2.8         2.1         -8.0           219.4         24         5.7         .39         20.4         -16.7         2.7         -2.8         2.1         -16.8           312.0         19         6.6         .47         27.8         20.4         -27.3         9.6         -47.5         -11.4         -15.6         -15.6           429.4         15         1.2         -27.3         9.6         -27.3         9.6         -17.4         -15.6         -15.6         -15.6           429.4         15         1.2         -27.3         9.6         -27.3         9.6         -17.6         -15.7         -17.6         -15.6         -15.6           59.4         1         30.5         -27.3         19.6         -15.3         -11.3         -15.	Meters	m11s	meters	mis	m11s	Dec	Inc	Head	7,411	ě	inc.	200	Inc	ပိုင်	Jac.	meters	meters
143.4   16   2.0   .1k   11.9   -11.9   1.0   -2.0   .2.8   2.1   -18.0     143.4   10   3.6   .2a   17.3   -16.7   2.7   -2.5   -4.5   2.1   -16.8     219.4   24   5.7   .39   20.4   -19.7   5.7   -5.1   -1.9   -1.4   -25.6     312.0   19   8.6   .47   21.9   -27.1   9.6   -4.3   3.4   -6.5   34.2     429.4   15   12.0   .56   25.2   -27.1   9.6   -11.8   13.7   -16.8     429.8   15   20.8   .77   29.0   -28.4   10.6   -17.8   13.7   -16.3   -16.5     1412.0   18   68.8   1.28   29.0   -28.4   10.6   -17.4   13.7   -16.3   -16.5     1412.1   22   88.5   1.62   20.8   -19.9   -19.0   10.5   -12.7   -5.4     1211.3   22   88.5   1.79   19.0   -18.1   9.1   -10.0   -48.4     1226.0   24   97.2   1.79   19.0   -18.1   9.1   -10.0   -48.4     1226.0   24   97.2   1.79   19.0   -18.1   9.2   -17.8   8.5   -10.2   -45.4     1226.0   24   97.2   1.79   19.0   -18.1   9.2   -17.8   8.5   -10.2   -45.4     1226.0   24   97.2   1.79   19.0   -18.1   9.2   -17.8   8.5   -10.2   -45.4     1226.0   24   24.8   25.1   -4.9   -18.1   9.1   -10.0   -48.4     1226.0   24   97.2   1.79   19.0   -18.1   9.2   -17.8   8.5   -10.2   -45.4     1226.0   24.8   25.1   -4.9   -18.1   9.2   -17.8   8.5   -10.2   -45.4     1226.0   24.8   25.1   -4.9   -18.1   9.2   -17.8   8.5   -10.2   -45.4     1226.0   24.8   24.8   24.8   24.8   24.8   24.8   24.8   -10.2   -45.4     1226.0   24.8   24	2000	36.8	647	6.	<b>8</b> 0 ·	, D.	ć.à-		7		۲.	7	1.5	-5	5		~
143.4       10       3.6       .29       17.3       -16.7       2.5       -2.5 <t< td=""><td>4070</td><td>83.3</td><td>38</td><td>2.0</td><td>×1.</td><td>12.9</td><td>-12.9</td><td>1.0</td><td>0</td><td>σ. ~ !</td><td>7.7</td><td>-8.0</td><td>. y.</td><td>ż</td><td>6</td><td></td><td>۲,</td></t<>	4070	83.3	38	2.0	×1.	12.9	-12.9	1.0	0	σ. ~ !	7.7	-8.0	. y.	ż	6		۲,
219.0       24       5.7       .39       20.4       -19.0       5.7       -5.1       -1.4       -15.4       -1.4       -15.4       -1.4       -15.4       -1.4       -15.7       -15.7       -15.4	9009	143.4	01	3.6	D	17.3	-15.3	2.3	-2.5	-4.5	.;	-:6.8	16.8	٠	-		~
1312.0   19   6.6   .47   23.2   -24.6   14.2   11.0   0.2   -11.7   -46.4     420.4   15   12.0   .56   25.2   -24.6   14.2   -11.0   0.2   -11.7   -46.4     601.7   8   20.8   .67   28.2   -27.1   19.0   -15.8   13.6   -15.6     159.8   3   30.5   .77   29.0   -28.6   19.6   -15.2   13.7   -16.3     160.0   10   49.3   .90   29.0   -28.6   19.6   -15.7   -16.7   -16.5     1711.3   22   88.5   1.152   20.8   -19.9   19.0   -18.1   9.1   -10.9   -28.4     1726.0   24   97.2   1.79   19.0   -18.1   19.2   -17.8   8.5   -10.2   -45.4     1726.1   10   10   10   10   10   10   10     1726.1   10   10   10   10   10     1726.1   10   10   10   10   10     1726.1   10   10   10   10   10     1726.1   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10     1726.1   10   10   10   10   10     1727.1   10   10   10     1726.1   10   10   10   10   10     1726.1   10   10   10   10   10     1727.1   10   10   10   10   10     1726.1   10   10   10   10   10   10     1726.1   10   10   10   10   10   10   10     1726.1   10   10   10   10   10   10   10	8000	219.0	54	5.3	. 39	30.4	6.91-	5.7	-5.1	6::-	7: -	-25.4	23.2	-	0		-1
426.4   15   12.0   .56   25.2   -24.6   14.2 -11.9   9.2   -11.7   -45.4     501.7   8   20.6   .67   28.2   -27.1   19.0   -15.8   13.6   -15.6     759.8   3   30.5   .77   29.0   -28.5   19.6   -17.2   13.7   -16.3     1412.0   18   68.8   1.28   25.1   -24.0   20.4   -19.0   10.5   -12.7   -55.6     1210.3   22   83.5   .1.62   20.8   -19.9   10.5   -12.7   -57.6     1246.0   24   97.2   1.79   19.0   -18.1   19.2   -17.8   8.5   -10.2   -45.4     1	1 0000	312.0	61	8.6	1	a	-23.3	6.6	. <del>.</del> .		-6.5	3.76-	7:	4	Ş	3	c
501.7   8   20.8   .67   28.2   -27.1   19.6   -13.8   13.6   -15.6   -35.9     559.8   3   30.5   .77   29.0   -28.5   10.6   -17.4   13.7   -16.3   -61.5     10.2   .49.3   .49   .29.0   -28.0   19.6   -17.4   13.7   -16.3   -61.5     10.2   .49.3   .49.3   .29.0   -28.0   19.6   -17.4   13.2   -12.7   -55.6     10.1   .49.3   .49.3   .20.2   -13.9   19.6   -18.1   .9.1   -10.0   -28.9     10.2   .49.3   .49.3   .49.0   -18.1   .9.2   -12.7   -57.6     10.2   .49.3   .49.3   .49.0   -18.1   .9.2   -12.7   .45.4     10.3   .49.3   .49.3   .49.3   .49.3   .49.3   .40.2   .45.4     10.4   .49.3   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3     10.5   .49.3   .49.3   .49.3     10.5   .49.	12000	4.29.4	1.5	12.0	45.	25.2	6.44.		-11.9	.,	-11.3	4.4	44.5	==	==	וכאון	, ,
759.8       3       30.5       .77       29.0       -78.5       19.6       -17.4       13.7       -16.3       -61.5         967.7       10       -49.1       .99       29.0       -28.0       19.6       -17.4       13.7       -15.7       -55.6         1112.0       18       68.8       11.28       25.1       -24.0       20.4       -19.0       10.5       -12.7       -57.6         1216.0       2       83.5       .1.62       20.8       -19.9       10.0       -18.1       9.1       -10.0       -28.4         1246.0       24       97.2       11.79       19.0       -18.1       19.2       -17.8       8.5       -10.2       -45.4	00071	601.7	&	8.02	<u>.</u> 4.	28.2	-27.1	1 1	π	13.6	-15.5	- 35.9	۲. ۲	<u>o</u>	p!-	14/14	σ
967.7 10 39.3 .99 29.0 -29.0 19.60.0 12.2 -12.7 -55.6 1112.0 18 68.8 1.28 25.1 -24.3 20.4 -19.0 10.5 -12.7 -55.6 1211.3 22 88.5 1.16.2 20.8 -19.9 19.6 -18.1 9.1 -10.0 -28.9 1246.0 24 97.2 1.79 19.0 -18.1 19.2 -17.8 8.5 -10.2 -45.4	14890	. 59.8		30.5	::	29.0	> 8°-		7.7	13.3	-16.3	-41.5	61.2	7	-23	108	10
1112.0 18 68.8 1.28 25.14.3 20.4 -19.0 10.5 -12.7 -57.6 1211.3 22 88.5 1.62 20.8 -19.9 10.6 -18.1 0.1 -10.0 -48.9 1246.0 24 97.2 11.79 19.0 -18.1 19.2 -17.8 8.5 -10.2 -45.4	1.000	2.796	01	6.95	ōō.	0.05	-29.0	1	0.0	12.2	-14.7	-45.6	62.4	57	77-		=
1246.0 24 97.2 1.79 19.0 -18.1 19.2 -17.8 8.5 -10.2 -45.4	12000	1,12.0	81	6.89	1.28	25.1	5.42-		n. 61-	10.5	-12.7	-53.6	56.0	2.2	-22		77
1246.0 24 97.2 1.79 19.0 -18.1 19.2 -17.8 8.5 -10.2 -45.4	10000	1211.3	22	83.5	1.62	30.8	3. <del>7</del> -		1.8.1	1.0	-10.9	4.82-	ec	0;	6:-		2
	9.200	1246.0	24	97.2	1.79	0.61	-18.1		a./	8.5	-10.2	-45.4	44.3	6.	-18		1.5
														_			-

Table A-10 M109 howitzer, 155mm, firing XM718

	Prob. Error	Pange	meters																
		of 1 lb	Inc																
		Proj. Wt.	260												_				
e 1 of		Air Density	Inc																
-(-  <u>}</u>	tarel	ALE	يق	_	-			_		_									
1 of	Suoi	perature 11	36.							<u></u>									İ
Pace 1	Range Corrections (metars)	Air Tempovature IN	Sec																_
	Pres	Lange-Mind Likno*	7411																
			Hea?					ļ 								   			
		Muzzie Velocity I moter/sec	100																
		Museur I net	ĕ																
	PCTIONS	Cross-Wind 1 knot	311.																
Basic Projectile: XM718	Azimurh Corrections	Orni to Sefa	3115	19.	51.8	19.3	: . 6;	19.4	48.4	19.4	+8. i.	20.1	0°u7	7 61	6.87	18.4	1.84		-
Basic Proj Source: Computer Simulations	Elev. Corr.	ושו	neters																
er Sia		Range	meters	3578	2688	1462	3353	5927	4483	503	569A	9295	7118	2119	1295	7658	5818		
360) : <b>8</b> 0	BASIC	Elev.	mils	000	1155.6	80:3	1155.6	800	1155.6	800	1155.6	800	1155.6	800	1155.6	800	1155.6		
Sour		Charge	1	1341 L	:	341 2		93A1 3	:	8381 4	=	341 5	:	M4A2		94A2	-	_	

Table A-10 (continued)

Source   Computer Staniation   State   Core   Assembly Corections   Charge   Else   East   Core   Assembly Corections   Charge   Else   East   Core				basic Pro	Basic Projectile: XHZA						Page 4	ا ا	ļ				
Elev.   Parige   Elev.   Corr.   Akimuh Corrections   Pakin   Parige   Pa	Sou;	ος. Σου : ΦΩΙ	mputer S1	nulation							Ä	so Curre	ntly Us	ed For	She 11:		
Eige.   Parige   Intil Corr. to Left   Liver		Basic			Azımuth Cor	rections				Jange	Correct	Tons (me)	ters)				Prob. Zrror
1155   meters   meters   mils   mils   mils   meters   mils   m	Charge	Elev.	Range		Drift Corr. to Lefa	Cross-Wind I knot		Velocity :er/sec		innd	Air Teng	serature	Air	ensity 1.	Proj. Wt	of 1 lb std.	Range
800   155.6   25.7   1155.6   125.7   1155.6   14319   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   11200   1155.6   1155.6   11200   1155.6	;	mı 1s	meters	meters	s ĭ tw	EL1S	Dec	Inc	1	[ail	Sec.	Inc	ě	Inc	Dec	Inc	meters
11155.6 726.7 800 11712 1155.6 907.2 800 14319 1155.6 11200	944A.2	908	0876		20.2												
800 11712 1155.6 9072 800 14319 1155.6 11200	=	1155.6	7267		50.2												
1155.6 9072 800 14319 1155.6 11200	H4A2	800	11712		22.2												
1155.6 11200	   :	1155.6	9072		54.9												
1155.6 11200	3442 7	800	61641		24.3												
	=	1155.6	+		60.1												

Table A-11 M109A1 howitzer, 155mm, firing M107

\$uc							7 6					ı
Azimuth Corrections			,		Also Curi	Also Currently Used for Shell:	ed for	Shell:	Mi10, Mi16,	M116, M12i	_	,
				Range (	Correction	Range Corrections (meters)	rs)				Prob.	Errors
Orift Cross-Wind Corr. to Left : knot	Muzzle Velocity 1 meter/sec		Range-Wund 1 knot		Air Temperature	erature	Air Density	nstty	Proj. W	Wt. of 159	Range	2 E C C
mils mils	ο Δ	Inc	Head	Tail	Dec.	Inc	ě	Inc	ĕ	Inc	meters	me ters
2.5 .05	6.6	-8.6	.1		0	0	2	.2	01,	2	12	
5.6	19.3	-16.9	7.		0	0	6.1	6.	-19	20	24	2
51. 0.01	28.2	-24.8	1.0	3	0	٥	-2.1	2.1	-28	28	35	_
20.1 .25	34.2	-32.4	2.0	9:1-		0	-3.7	3.8	-35	35	4.5	~
9.9/	28.0	-25.0	1.3	=	0	0	-2.0	2.3	-24	25	35	-
153.1	23.5	-22.8	-1.5	-		0	s.	0	-18	18	35	
				<del>                                     </del>								
			+									
				+	†			1			-	
			-									
								-				
			-	-				-		<del> </del>	-	
			<del> </del>	$\vdash$	<del> </del>	1	1	†-		<del>-</del>  -	1	T
		<del> </del>	<del> </del>	<del> </del>	-		1-	+			$\dagger$	T
	 	<del> -</del> - 	↓ 	   	+					<del>                                     </del>		T

Table A-11 (continued)

		Basic ?	Basic Projectile: M107, Fuze M557	L Fuze MS57			1	ธ์	1190: 26	Chirgo: 26 (237.7 m/s)	(5/a					1
	Sour	Source: FT155-AM-1	AM-1				ŀ		Liso Cur	Also Currently Used for Shell:	ed for		M110, M116, M121	116, 9121		1
I I	Basic	Elev. Corr.	Azimuth Corrections	rections				Pange	Correction	Mange (orrections (meters)	rs)				Pr.	rrors
Range	Elev.		Drift Corr. to left	Cross-Wind 1 knot	Muzzle V	Muzzle Velocity l meter/sec	Range-Wind 1 knot	Wind	Air Temp	Temperature 10	Air Density	risity	Proj. Wt. 4 Sq	std.	Range	! ! 5
Meters	m.i.1.s	meters	mils	#11s	Dec	Inc	Head Tail	Tail	Dec	Inc	Sec.	Inc	Dec	Inc	meters	moters
1000	30.8	11	1.9	٠0٠	8.8	2727	1.	1	0	0	2	.2	01-	2	٠	-
2000	189.3	10	4.3	80.	17.1	-15.2	7.	7 -	0	0	6	6.	61-	o;	07	~
3000	301.8	8	7.2	.13	25.0	-22.3	6.	8	0	0	-2.0	2.1	- 28	23	16	~
0004	443.1	9	11.3	81.	32.5	-29.1	1.7	7.1-	0	o	-3.6	3.7	-35	2 2	23	-7
2000	722.4	2	22.5	. 28	36.8	-55.6	2.7	-2.3	0	0	-5.8	5-7	-41	Ę	32	æ
4000	0.9111	9	61.8	+9.	32.1	-28.7	2.6	1:-	0	a	-4.3	5.4	-31	32	25	80
3000	1242.1	10	131.8	1.45	25.1	-23.3	٦. ١	1.6	0	0	7	1.5	-21	77	14	αc
27.38	1265.0	11	166.9	1.45	24.0	-23.3	-1.0	1.6	0	-:1	7	r.	-18	61	14	80
-																
																:
										       						•
SARFA - PA	(40)	SARPA-PR (UT) 2768 Dec 75						1								

Table A-11 (continued)

Sauce   Fil35-Ki-1   Sauce   Fil35-Ki-1   Sauce   Corrections   Correc			O T S P S	10 10 10 10 10 10 10 10 10 10 10 10 10 1	100			ļ	زَّ	Charge:		1011					!
Elev. Corr.   Azimuth Corrections   Azimuth Corrections   Corrections		Sou	- 1	:1-1				1		Also Cur.	rently Usa	to: pa		H 10,	16, M121		1
Elev.   1911   Drifte   Cross-Wind Huzzle Velocity   Anne-Mind   Air Temperature   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Logic   Air Definity   Air Definity   Logic   Air Definity   Air Definity   Logic   Air Definity   Air Definity   Logic   Air Definity   Air	ä	#1c	Elev. corr.	Azimuth	rections				Pange	Correcti		rs)				Prob. B	Errors
mils         meters         mils         Dec         lnc         Head         7a1         Dec         lnc         l	Range	Elev.	ואָה נ	Drift Corr. to Left	Cross-Wind 1 knot	1	/elocity	Range	-Mind not	Air Temp	erature	Atr De	nsity		. of 155	Ranse	2ef1.
66.5         13         7.4         -6.7         7.4         -6.7         7.4         -6.7         7.2         -10.2         7.2         -10.2         7.2         -10.2         7.2         -10.2         10.2         -10.2 <t< th=""><th>lete, s</th><th>1118</th><th>meters</th><th>mils</th><th>F1\$</th><th>Į.</th><th>Inc</th><th>Head</th><th>7411</th><th>o d</th><th>Inc</th><th>Dec.</th><th>Inc</th><th>Dec</th><th>Inc</th><th>meters</th><th>meters</th></t<>	lete, s	1118	meters	mils	F1\$	Į.	Inc	Head	7411	o d	Inc	Dec.	Inc	Dec	Inc	meters	meters
137.5       14       3.0       .C7       14.5       -13.1       .4      3       0       0      9       .9       -19         713.6       12       4.9       .11       21.2       -19.2       .8      7       0       0       -2.0       2.1       -28         302.8       11       7.2       .15       27.6       -23.1       1.4       -1.2       0       0       -2.0       2.1       -28         408.0       8       10.2       .19       33.7       -30.7       2.2       -1.9       0       0       -3.6       3.6       -41         584.3       5       15.1       .25       39.6       -36.1       3.4       -2.8       0       0       -8.0       8.1       -41         690.4       3       15.1       2.5       39.6       -35.3       0       0       -8.0       8.1       -42         1004.6       5       4.3       .31       40.1       -38.8       3.9       -3.3       0       0       -8.0       9.4       -49         124.7       9       6.7       3.5       1.3       1.2       1.3       0       0       -9.3       <	1000	6.6.5	2	1.3	εο.	7.4	-6.7	-:		0	0	2	.2	-10	01	7	~-
115.6       12       4.9       .11       21.5       -19.2       .8       -1.7       0       0       -2.0       2.1       -28         362.8       11       3.2       -15       27.6       -25.1       1.4       -1.2       0       0       -3.6       3.6       -41         408.0       8       10.2       -19       37.7       -30.7       2.2       -1.9       0       0       0       -51 <td< td=""><td>2000</td><td>137.5</td><td>14</td><td>3.0</td><td>73.</td><td>14.5</td><td>-13.1</td><td>7.</td><td>·.</td><td>0</td><td>С</td><td>6</td><td>6.</td><td>-19</td><td>20</td><td>2</td><td>7</td></td<>	2000	137.5	14	3.0	73.	14.5	-13.1	7.	·.	0	С	6	6.	-19	20	2	7
362.8       11       7.2       .15       27.6       -25.1       1.4       -1.2       0       0       -3.6       3.6       -35         408.0       8       10.2       .19       33.7       -30.7       2.2       -1.9       0       0       -5.5       5.6       -4.1         554.3       5       15.1       .25       39.6       -36.1       3.4       -1.8       0       0       -8.0       8.1       -4.7         660.4       3       15.1       .25       39.6       -3.8       3.9       -3.8       0       0       -8.0       8.1       -4.7         1004.6       5       43.8       .31       40.1       -38.8       3.9       -3.3       0       0       -9.4       9.4       -4.9         1266.7       9       65.8       .31       -30.1       -31.3       0       0       -9.4       -4.9         1266.7       9       66.8       .32       .32       -32       .3       -3       0       0       -9.4       9.4       -4.9         1267.8       13       11.2       12.2       11       -2       11       -2       12       -2       12 <td>3000</td> <td>215.6</td> <td>12</td> <td>6.4</td> <td>17.</td> <td>21.2</td> <td>-19.2</td> <td>æ.</td> <td>7</td> <td>0</td> <td>0</td> <td>-2.0</td> <td>2.1</td> <td>-28</td> <td>28</td> <td>11</td> <td>Τ,</td>	3000	215.6	12	6.4	17.	21.2	-19.2	æ.	7	0	0	-2.0	2.1	-28	28	11	Τ,
408.0       8       10.2       .19       33.7       -30.7       2.2       -1.9       0       C       -5.5       5.6       -41         554.3       5       15.1       .25       39.6       -36.1       3.4       -1.9       0       C       -8.0       8.1       -47         690.4       3       20.8       .31       40.1       -38.8       3.9       -3.3       0       0       -9.4       9.4       -49         1004.6       5       43.8       .31       -15.6       4.5       -3.3       0       0       -9.4       9.4       -49         1146.7       9       6.7.8       .72       13.6       4.5       -3.3       0       0       -9.3       9.4       -43         1241.8       13       11.5       2.2       13.1       1.4       2.2       1       0       -9.3       4.1       -76         1285.0       17       194.1       11.6       24.7       -23.7       -2.0       2.2       1       -1.6       7       -23         1285.0       17       194.1       11.6       24.7       -23.7       -2.0       2.2       1       -1.6       7       <	7000	302.8	11	7.2	.15	27.6	-25.1	1.4	-1.2	   •	0	-3.6	3.6	-35	36	16	-3
554.3       5       15.1       .25       39.6       -36.1       3.4       -1.8       0       0       -8.0       6.1       -47         690.4       3       20.8       .31       40.1       -38.8       3.9       -3.3       0       0       -9.4       9.4       -49         1004.6       5       43.8       .31       39.3       -15.6       4.5       -1.3       0       0       -9.4       9.4       -49         1146.7       9       67.8       .72       33.1       -10.1       17       -7       0       0       -6.9       3.4       -43         1124.8       13       (15.7)       1.25       27.3       -25.1       1.4       2.2       .1       0       -6.9       7.2       -35         1285.0       17       194.1       1.66       24.7       -23.7       -2.0       2.2       .1       -1.6       .7       -23         1285.0       17       184.1       1.66       24.7       -23.7       -2.0       2.2       .1       -1.6       .7       -2.3         1286.0       17       184.1       1.66       24.7       -23.7       -2.0       2.2 <td< td=""><td>2000</td><td>408.0</td><td>8</td><td>10.2</td><td>61.</td><td>33.7</td><td>-30.7</td><td>2.2</td><td>-1.9</td><td>0</td><td>ں</td><td>-5.5</td><td>5.6</td><td>-41</td><td>43</td><td>21</td><td>2</td></td<>	2000	408.0	8	10.2	61.	33.7	-30.7	2.2	-1.9	0	ں	-5.5	5.6	-41	43	21	2
690.4       3       20.8       .31       40.1       -38.8       3.9       -3.3       0       0       -9.4       9.4       -49         1004.6       5       43.8       .31       39.3       -15.6       4.5       -3.3       0       0       -9.4       9.4       -49         1246.7       9       65.8       .72       33.1       -30.1       37.7       -7       0       0       -9.3       9.4       -43         1241.8       13       1,25       27.3       -25.1       1,4       2.2       .1       0       -5.9       7.2       -35         1285.0       17       194.1       1.66       24.7       -23.7       -2.0       2.2       .1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -1       -2       -3       -3       -1       -2       -3       -3       -4       -4       -4       -3       -4       -4       -4       -3       -4       -4       -4       -3       -4       -4       -4       -4       -4       -4       -4       -4       -4       -4 <td>9009</td> <td>554.3</td> <td>2</td> <td>15.1</td> <td>.25</td> <td>39.6</td> <td>-36.1</td> <td>3.4</td> <td>8</td> <td>0</td> <td>0</td> <td>-8.0</td> <td>8.1</td> <td>-47</td> <td>87</td> <td>27</td> <td>1</td>	9009	554.3	2	15.1	.25	39.6	-36.1	3.4	8	0	0	-8.0	8.1	-47	87	27	1
1247.6 5 5 43.8 .51 39.3 -15.6 4.5 -3.3 0 0 0 -9.3 9.4 -43 1247.8 13 115.7 1.25 27.3 -25.1 1.4 2.2 .1 0 -6.9 7.2 -35 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .1 -1 -1 -1.6 .7 -23 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .1 -1.6 .7 -23 1285.0 18 19 194.1 1.66 24.7 -23.7 -2.0 2.2 .1 -1.6 .7 -23 1285.0 19 194.1 1.66 24.7 -23.7 -2.0 2.2 .1 -1.6 .7 -23 1285.0 19 194.1 1.66 24.7 -23.7 -2.0 2.2 .1 -1.6 .7 -23 1285.0 19 194.1 1.66 24.7 -23.7 -2.0 2.2 .1 -1.6 .7 -23 1285.0 19 194.1 1.66 24.7 -23.7 -23.0 -2.0 -2.0 -2.0 -2.0 -2.0 -2.0 -2.0 -2	9059	4.069			18.	40.1	-38.8	3.9	-3.3	0	0	4.6-	9.4	64-	20	31	∞
1246.7 9 67.8 .72 33.1 -30.1 3.77 0 0 -6.9 7.2 -35 1241.8 13 115.7 1.25 27.3 -25.1 1.4 2.2 .1 0 -3.3 4.1 -26 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .111 -1.6 .723 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .11 -1.6 .723 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .11 -1.6 .723 1285.0 17 184.1 1.66 24.7 -23.7 -23.7 -2.0 2.2 .11 -1.6 .723 1285.0 17 184.1 184.1 185.1 18	9009	1004.6	<u> </u>		. 51	39.3	-15.6	4.5	-3.3	0	0	-9.3	9.4	-43	45	30	2
1241.8 13 115.7 1.25 27.3 -25.1 1.4 2.2 .1 0 -3.3 4.1 -26 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .11 -1.6 .7 -23 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .11 -1.6 .7 -23 1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .11 -1.6 .7 -23	5000	1246.7	6	8.7.8	27.	33.1	-30.1	3.7	7	_ _	0	6.9-	7.2	-35	37	23	11
1285.0 17 194.1 1.66 24.7 -23.7 -2.0 2.2 .11 -1.6 .7 -23	4000	1241.8	13	115.7	1.25	27.3	-25.1	1.7	2.2	- ت	0	-3.3	4.1	-26	28	15	17
	3355	1285.0	17	1.461	1.66	24.7	-23.7	-2.0	2.2	.1	11	-1.6	.7	-23	61	1.5	=

'Table A-11 (continued)

		0 ()	E. Stoletile:	M107, Fuze M557	5.7		1	<b>ق</b>	Charge: 46	4C (318.5m/s)	(8)	İ				1
	Sou	Source: FT:55-A	5-AM-1					-	Also Currently Used for Shell:	ently Use	ed for	Shell:	H110, 1	MI10, MI16, MI21		1
Ä	Basic	Elev. Corr.	Azimuth Corr	Correct tons			İ	Pru de	Range Corrections (meters)	ns (meter	(£				Prob. E	Errors
Range	Elev.	1 111	Drift Corr. to Left	Cross-Wind	Muzzle Velocity I neter/sec	elocaty r/sec	Range-Wind 1 knot		Air Temperature	rature	Air Density	nsity	Proj. Wt. 4 Sq	. of 15q Std.	Range	Defl.
Heters	anls	meters	muls	male	Dec.	Inc	Head	Tan	<b>De</b> C	Inc	Dec	Inc	Dec	Inc	meters	meters
1000	50.6	19	80.	.03	6.1	-5.0	.,	i	1.8	3	٤٠-	.3	6-	6	4	7
2000	104.2	18	2.0	.07	11.8	-9.2	2.2		5.0	80.	-1.0	1.0	-16	18	9	~
3000	161.9	1:1	3.2	01.	17.2	-13.2	3.7	a.	8.0	-1.3	-2.1	2.1	-23	25	6	6
000.1	224.7	15	4.6	61.	22.4	-17.2	5.1	-1.4	10.5	-1.6	-3.7	3.7	-29	31	13	~
5000	294.8	13	6.2	.1.	27.5	-21.2	6.5	-2.0	12.4	-1.9	-5.6	5.7	-34	37	17	7
6000	375.9	=	8.2	.21	32.4	-25.3	7.8	-2.8	13.8	-2.1	-8.0	8.1	-39	43	22	~
000.	476.9	6	10.9	.25	37.2	- 29.4	0.6	-3. ?	14.7	-2.2	-10.7	11.0	-43	47	27	~
8000	634.0	7	16.1	.32	41.1	-33.6	9.6	-4.8	8.41	-2.1	-14.0	14.5	-47	51	34	∞
8 300	760.9	2	21.6	.34	41.1	-34.9	9.6	-5.3	14.6	-2.1	L15.1	15.0	87-	52	34	то
8000	924.1	7	31.5	87.	1.14	-34.7	9.6	-5.ń	13.3	-1.8	-15.5	15.4	-45	90	37	=
000/	1078.1	6	47.3	.62	37.3	-30.7	7.9	-4.3	11.11	-1.5	-13.1	13.3	07-	44	32	12
9009	1174.9	12	65.9	.81	32.5	-26.7	4.2	٠, ١	9.6	-1.3	-10.2	10.6	-33	36	56	12
2000	1247.8	٦,	100.4	1.22	27.5	-22.6	3.6	~;	8.5	-1.2	-6.2	7.2	-24	28	18	2
4104	1295.0	21	171.4	1.70	24.4	-20.4	-1.6	3	8.3	-1.4	-3.9	2.6	-19	15	18	12
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Table A-1! (continued)

		Δ	MIC WILL WILL	M10', Fuze M557				§	Charge: SC	5C (374.9 n/s)	(8/1					
	Sour	Source: FT155-AM-1					 		Also Curr	Also Currently Used for Shell:	ed for	Shell: _	M110, M1	M16, M21		
2	Basic	Elev. Corr.	Azımuth Cor	Corrections				Range	Corrections	ns (meters)	(S)				Prob. E	Errors
Range	Elev.	1 m 1	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity l meter/sec	elocity r/sec	Range-Wind I knot	-Wind 10t	Air Temperature	erature	Air De	Density 1	Proj. Wt. 4.Sq.	. of 1.59	Range	Defil.
Meters	11.18	meters	mils	mils	Dec	Inc	Head	7631	ρθζ	Inc	Dec Dec	Inc	Dec	Inc	meters	meters
0001	38.2	54	6.	30.	5.0	8.1-	. 2	3	0	4	۲٠٠	.,	6-	6		-
3000	81.8	22	2.0	71.	8.2	-8.1	1.:	-1.5	1.6	-3.3	-2.1	2.0	-14	15	1.7	2
3000	129.6	20	3.2	6: 	10.3	-10.5	2.8	-3.2	6.6	6.7-	-3.7	3.5	-17	17	6	3
4000	181.3	61	4.4	. 23	12.0	-12.2	5.0	-5.1	11.3	-12.7	-5.4	5.2	-18	19	10	3
2000	237.2	17	5.8	.26	13.7	-13.7	7.2	6.9-	16.6	-17.3	-7.5	7.3	-19	20	12	7
0009	298.7	15	7.3	.29	15.4	-15.3	4.6	-8.7	21.4	-21.4	-10.c	6.6	-20	20	15	5
7,000	368.1	13	9.1	.33	17.3	-16.9	11.6	0.5	25.5	-25.0	-12.9	12.9	.20	20	18	9
8000	450.1	11	11.4	.33	7.61	-18	13.6	-12.1	28.9	-28.1	-16.4	16.5	-19	20	21	7
0006	557.8	80	6.41	24.	21.8	-20.8	15.4	-13.6	31.4	-30.6	2.02-	20.6	-19	20	25	6
0086	2.717.	3	21.3	67.	25.7	-22.7	15.5	-14.7	31.9	-32.0	-23.8	23.7	-18	20	27	10
0006	1012.2	88	42.2	.72	23.2	-22.1	15.2	-11.2	28.6	-27.0	-23.4	23.2	-16	18	28	14
8000	1114.2	12	55.4	.87	6.0،	-19.8	13.1	-8.6	25.3	-24.1	-20.2	20.3	-14	91	24	25
7000	1189.2	15	74.8	1.09	7.81	-17.2	0.11	-4.5	22.6	-21.7	-16.5	16.9	6-	Ξ	20	15
6000	1248.1	6?	107.0	1.49	15.5	-14.3	8.2	-3.9	20.7	-20.1	-11.7	12.9	-2	7	16	15
5042	1290.0	26	1,74.1	1.89	12.1	-31.4	3.1	6.5-	20.4	-20.4	-9.8	7.3	12	-1,1	٩	52
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Table A-11 (continued)

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			M102 F1120 MSS 7	7 Euze WSS 7	<u> </u> 			ŧ	Charge: 3W (292.6 m/s)	(292,6 11)	/s)					
	Scui	Scurce: FT.155-AM-1	Y-1				}	;	Also Currently Used for Shell:	ently Use	d for	Shell: _	M110, M116, M121	5, 3121		
3	Basic	Elev. Corr.	Azimuth Corrections	rections				Sange.	Corrections	ns (meters)	(8)				Prob. E.	Errors
Range	Elev.	1 mil	Drift Corr. to Left	Cross-Wind	Muzzle Velocity l meter/sec	elocity r/sec	Range-Wind 1 knot		Air Temperature	rature	Air De	. Density	Proj. Wt.	of 1 Sq Std.	Range	Defl.
Meters	mils	meters	mils	mils.	Sec.	J.,C	Head	lie	Dec	inc	Dec	Thc	ာ <b>မ</b> င်	Znc	meters	meters
1 100	59.7	16	1.2	:03	7.0	-6.3	.2	1	.1	0	2	.2	6-	6	::	-
2000	123.2	15	2.6	.07	13.7	-12.4	٠.5	3	.2	0	6	6.	-17	81	22	2
3000	192.1	14	4.3	.10	20.1	-18.2	1.0	9	٠,	0	-2.0	2.1	-24	25	32	
0007	268.6	12	6.2	.14	26.1	-23.7	1.6	-1.1	.3	0	-3.5	3.6	-31	32	42	4
2000	357.0	01	8.7	.18	31.9	-29.1	2.3	-1.8		0	-5.5	9.6	-36	37		5
9609	467.6	88	12.0	.23	37.4	-34.2	5.3	-2.6	7.	0	-7.9	8.0	-4.1	4.2	61	و
7090	646.6	3	16.8	.30	41.7	-39.2	9.7	-2.6	.3	0	-10.8	11.2	-45	7.6	5	<b>∞</b>
7200	734.9	2	23.1	.31	41.7	-40.2	4.6	-3.9	٤,	0	-11.5	11.7	-45	4.	70	80
7000	912.3	3	34.8	57.	41.7	-38.8	9.7	-4.3	.3	0	-11.9	11.8	-42	77	69	=
90u9	1088.3	a	55.4	.62	36.9	-33.6	8.4	-2.9	.2	0	-9.7	6.9	-36	3.7	09	12
2000	1193.4	=	82.5	88.	31.2	-28.6	3.5	1.1	.2	0	-6.8	7.3	-28	e	5.1	12
0007	1268.9	91	148.6	1.69	25.9	-24.3	1	1.1	.3	1	-2.8	3.4	-19	20	47	12
3616	1290.0	. 81	192.4	1.69	25.0	-23.9	-1.8	1.1	.2	2	-2.8	1.3	- 19	15	47	12
	_															
<u> </u> 																
SARPA-	الإرساع	SAKFA-PK (177) 2/100 Dec 75					]	]								

Table A-11 (continued)

		Errors	Defil.	meters	7	2	6	~	-7	S	•	æ	9	1.2	13	2	13	2		
		Prob. E	Range	meters	ຜ	-23	15	2	23	28	33	39	43	77	38	32	53	25		
	16, 3121		of 159	Inc	1.	Ξ	11	17	19	2.1	23	25	12	77	21	18	2	-5		
	M110, M116,		Proj. Wt.	)ec	-7	-11	-13	-15	-17	61-	-20	-22	-23	-21	81	-13	7-	Š		
	for Shell:		nsity	Inc	7.	1.2	2.4	0.7	6.1	8.5	11.5	14.9	17.9	17.1	14.4	11.4	7.2	3.7		
न	d for S	is)	Air Density 10	Sec	4	-1.2	-2.4	-4.0	-6.1	-8.5	-11.3	-14.6	-18.0	-17.0	-14.1	-10.1	-5.7	-5.7		
(336.8 =/	ently 554	ns (mete)	Temperature 1%	Inc	-1.7	-4.8	6.7-	-10.6	-12.9	-14.7	0.9:-	-17.0	-17.1	-13.4	-11.7	-10.4	-9.7	6.6-		
Charge: 4W (336.8 m/s)	Also Currently Used	Range Corrections (meters)	Air Tempe	og d	1.9	6.6	11.9	16.8	21.0	24.4	27.1	29.0	29.1	25.1	21.8	19.2	17.5	17.4		
ਲੂ		Range	41nd	.a11	5	-1.4	-7.5	-3.5	9.4-	-5.7	-6.8	6-2-	0.6-	-7.6	-5.2	5	.3	£.		
	i		Range - Wind 1 knot	Head	9.	2.4	4.4	5.9	8.5	10.3	12.0	13.3	13.4	12.4	10.1	7.8	4.2	r.		
			elocity r/sec	Inc	-4.4	-7.1	-9.5	9.11.	-11	-16.3	7.61-	-22.4	-25.4	-24.6	-21.8	-18.7	-15.3	-13.7		
			Muzzle Velocity I meter/sec	) Sec	7.4	1.8	11.2	14.3	17.6	21.1	24.6	28.5	31.4	30.3	27.0	23.4	9.61	17.6		
7. Fuze 3557		ections	Cross-Wind	r118	.05	60.	.12	91.	61.	.22	.26	.31	. 38	.60	94.	1.00	1.58	1.81		
Basic Projectile: Will?, Fuze M557	-1	Azımuth Corrections	Drift Corr. to Left	mils	٥.	1.9	3.1	4.4	5.8	7.5	9.7	13.0	20.8	41.3	56.6	78.4	124.7	175.1		
Basic Pr	Source: FT155-AM-1	Elev. Corr.	1 m1	meters	12	61	18	1.7	1.5	13	11	,	~	80	=	15	20	24		
	Sour	ic	Elev.	at 1s	46.1	95.8	149.0	206.4	249.5	340.8	425.1	535.1	736.8	1025.2	1131.3	1209.7	1269.8	1295.0		
		Basic	<b>%</b> nợe	Meters	1000	2000	3000	4000	\$000	0009	700C	8000	8900	8000	7000	9009	T	4441		

Table A-11 (continued)

		Basic P	Basic Projectile: MIO7, Elize M557	7. Firze 2557				59   6	Charge: 5W (393,2 m/s)	(393.2 E	(s/					
	Scu1	Source: Filss-AM-1	2M-1				1		Also Curı	Currently Used for Shell:	ed for	Shell:	M110, M116,	116, %121		1
ag.	Basic	Elev. Corr.	Azimuth Cor	Corrections				Par.g.	Parge Corrections	ons (meters)	rs)				Prob. E	Errors
Range	Elev.	1 tut [	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle ' l meto	Muzzle Velocity 1 meter/sec	Range-Wand I knot	-Wand	Air Temp	Temperature 14	Air Density	ensity	Proj. Wt.	of 159	Range	Def1.
Meters	811E	meters	mils	nıls	Dec	Inc	Head	Tall	Dec	Inc	ğ	Inc	Sec.	Inc	meters	Beters
1000	34.7	27	σ.	80.	6.4	-4.5	٦.	77.	1	Đ	7	٠.	8-	8	80	1
2000	74.9	23	2.0	.15	8.7	-8.5	٠.	-1.0	.2	-1.4	-2.5	2.4	-13	7	12	2
3000	120.1	21	3.2	.21	11.0	-11.0	2.1	-2.5	3.0	-5.1	-4.4	4.2	-16	16	15	3
4000	169.4	20	4.4	.25	12.7	-12.8	4.1	-4.3	7.8	8.6-	-6.3	0.9	-17	81	18	3
2000	222.7	18	5.7	.28	14.2	-14.2	6.4	-6.1	13.2	5.41-	-8.4	8.1	-17	18	20	4
6000	280.9	16	7.2	. 32	15.7	-15.6	8.7	0.8-	18.3	-18.9	6.01-	10.7	-17	81	22	2
7000	345.7	7.7	8.9	. 35	17.2	-17.0	6.01	6.6-	22.8	-22.9	-13.8	13.7	-16	17	25	5
8000	420.4	1.2	11.0	. 39	19.0	-18.6	13.1	-11.6	36.6	-26.3	-17.2	15.2	-15	91	27	7
0006	512.¤	6	13.9	77.	6.02	-20.3	15.2	-13.3	29.6	-29.2	L21.1	21.3	-14	-5	es S	6
10000	4.424	5	7.61	15.	23.4	-22.2	1.91	-14.8	31.1	-31.5	-25.6	26.5	-12	77	34	01
10300	756.1	3	63.9	.53	23.4	-22.9	16.1	-15.2	31.1	-31.9	-27.1	26.5	-12	13	34	10
10000	922.1	\$	34.7	69.	23.8	-23.1	15.1	-13.4	30.8	-29.0	L28.3	27.3	-11	13	36	14
0006	1057.5	10	6.84	.84	22.0	-21.1	15.1	-11.1	26.8	-26.0	-25.1	24.9	6	11	33	15
600°	1142.9	7.	63.9	1.01	8.61	-18.8	13.2	-8.2	24.0	-23.5	-21.5	21.6	9-	ઢ	29	15
7000	1208.9	1.7	84.8	1.26	17.2	-16.2	11.1	-4.5	21.7	-21,4	-17.3	6 21	-2	-3	25	16
0009	1260.7	22	124.6	1.78	14.2	-13.1	7.9	-4.5	20.4	-20.5	-11.7	15.3	7	7-	61	91
:0 7 US	1290.0	53	183.6	2.07	11.5	8.01-	3.4	-1.5	20.4	-21.1	-11.0	8.3	ō,	-18	61	16
SARPA-P	SURPLIES (UT) 2768	100 Dec 75		1				-			$\left. \left. \right  \right.$					

Table A-11 (continued)

		Basic	Basic Projectile: "M	M107, Fuze 4557				8	rge: 64	Charge: 64 (475.5 m/s)	/8)					
	Sou	Source: FT155-AM-	AM-1				1	-	Aiso Cur	Also Currently Used for Shell:	ed for	She11:	×110, x	H116, M121		
ag.	Basic	Elev. Corr.	Azimith Coi	Corrections				Range	Range Corrections	ons (meters)	ra)				Prob.	Errors
Range	Elev.	1 1 1 1	Drift Corr. to beft	Cross-Wind 1 knot	Muzzle I mec	Muzzle Velcoity l meter/sec	Pange-Wince 1 knot	<u> </u>	Air Tem	Temperature 1%	Air D	Air Density	Proj. We	of 15q	Range	Peti.
Meters	Mils	meters	mils	mıls	Sec.	Inc	head	Tail	Dac	Inc	S A	Inc	) Q	Inc	meters	Meters
1000	23.5	0,5	9.	.06	4.2	-3.9	7.	1	-:2	7.	9	٩	6-	٥	60	
2000	50.4	35	1.5	.12	7.9	-7.5	7.	7.		۲.	-2.5	2.5	-15	15	10	_
3000	83.6	30	2.5	.18	11.2	-10.7	\$.	8	-1.5	<u>.:</u>	-5.5	5.6	- 19	61	13	2
4000	117.9	26	3.7	.25	17.9	-13.4	::	-1.7	-2.2	87	-9.3	9.2	-20	21	1.5	7
2000	159.4	23	5.0	.33	15.8	-15.4	3.2	-3.3	80	-1.7	12.9	12.3	-2i	22	81	_
3009	205.4	21	5.4	. 35	17.2	-17.0	5.1	c.4	2.7	-5.5	-16.0	15.1	17-	22	02	3
7000	255.7	19	6.5	۰ ئو	18.3	-18.2	7.2	   ¥	7.4	-9.7	18.9	18.0	-20	21	21	
8000	310.8	1.1	9.6	. 44	19.4	-19.2	9.6	-6.3	12.3	0.41	-22.0	21.2	-19	2,2	23	4
0006	371.9	15	11.5	oc oc	20.5	-20.2	12.0	-10.3	16.8	L17.9	-25.4	6.7%	-17	65	77	5
10000	4,1.8	13	13.8	. 52	21.7	1.3	14.4	7.2.5	20.8	-21.5	-29.4	29.2	-15	1.7	26	٠
11000	526.8	16	16.8	.56	23 0	-22.5	16.9	-14.2	23.9	-24.5	-34.0	54.2	-12	7.	82	0
1 2000	650.3	9	21.8	.63	24.6	-23.9	18.5	-16.0	26.1	-27.0	-39.2	8.04	6-	=	15	-
17400	758.4	3	£ 72	.65	24.8	-24.6	18.5	-14.8	26.2	-27.8	41.6	8.0%		6	=	_
00011	1069.7	Ξ	53.2	1.CA	:3.2	-22.5	18.2	-14.	22.8	-23.6	-39.9	39.1	-   -	2	8	=
10000	1124.5	15	66.6	1.15	21.2	-20.4	16.9	-:2.	20.9	-21.7	-35.6	35.3	0		27	=
8000	1230.4	57	109.7	1.69	15.4	-15 5	13.1	3.6	,,,	4.61-	25.3	26.1	92	8	20	1
4582 1280.0	1280.0		192.8	2.27	11.5	-iv.9	8.9	3.0.	.7	-20.5	-21.5	16.6	3.4	-30	<del>  -</del>   ≃	=
SURFILING	(45)	56 Dec 75					1	-		Ì		7				

Table A-11 (continued)

		Basic F	Basic Projectile. MI07, Fize M557	, Faze M557			1	3	, , ,				4			1
	Sou	Source: FT155-AM-	K-1				1		Also Currently Used for	ently Use	ed for :	Shell:	9110, 2115,	9, 3121		
ā	Basic	Elev. Corr.	Azimuth Corrections	rections				Pange	Mange Corrections (meters)	ns (metel	(8)				Prob. E	Errors
Pange	.v.12	1 mil	Drift Corr. to Left	Cross-Wind	Muzzle Velocity	le Velocity netel/sec	Range-Wind I knot	-Wird	Air Temperature	e, ature	Air Density 11	neity	Pro. Wt. 4 Sq	Est 30	Range	Def1.
Ke ters	9:38	Deters	sils	rile	Sec.	Inc	Head	1185	Dec	Inc	ŭ	73.0	Sec Dec	Inc	meters	meters
06,07	35.0	5.1	1:1	60.	6.7	-6.4	.3	·-·	۲٠-	9.	-2.2	2.3	-15	16	=	-
0607	87.3	38	2.7	61.	12.2	-11.7	1.2	-1.1	-2.6	7.7	-3.7	9.1	-22	23	77	7
9009	141.0	28	5.0	.32	16.5	-15.0	2.9	-2.7	-5.3	3.9	-18.9	19.2	-27	23	19	~
80(r0	220.7	23	1.9	34.	19.3	0.61-	6.2		-3.0	5	-28.6	27.2	-20	71	23	7
10000	318.1	61	14.3	.51	21.3	-21.0	10.6	-6.3	5.2	-8.1	-36.2	34.5	-16	18	26	2
12000	437.8	51	15.7	65,	23.1	-22.8	15.6	-12.3	13.8	5.21-	-44.2	43.5	-13	7.	9	^
0007	K15.8	8	22.7	69.	25.5	-24.9	20.5	-16.3	19.5	-20.8	-54.7	56.3	7-		34	-
14830	760.3	-	30.4	77.	25.4	-26 1	20.5	-18.5	20.3	-27.3	-40.0	58.4	-	۲۱	36	6
14000	980.7	01	49.2	1.30	26.1	-25.5	20.5	-14.3	18.5	-20.1	-62.3	9.66	7	-1	37	''
12000	1二	61	73.6	1.29	22.7	-22.0	20.2	7.,[-	15.7	-17.4	-52.6	52.0	6	در	32	=
10000	1214.0	27	112.1	1.75	18.2	-17.3	17.6	1.01-	14.5	-16.3	-40.2	41.5	20	-12	25	7
8074		1.3	209.2	27.43	11.6	-11.C		-19.1	15.4	-18.	-34.7	27.1	92	-51	25	4
							<u> </u>			   						
}								<u> </u> 								
STRPA	STRPIC-PK (OT) 2/86 Dec	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1														Ì

Table A-11 (continued)

So Basi. Range Exev. Meters atls 2000 23.6	Elev. C	1-47-551				ı	~	Also Currently Used for Shell:	antly Usr	for		M110, M116, M121	16, 3121		
1 5 N	Elev.								•	2					1
N T	r r	r. As muth Corrections	rections				Range C	Range Corrections (meters)	ns (mete)	is:				Prob. K	Errors
		1 3	Cross-Wind	Muzzle Velocity I meter/sec	/elocity r/sec	Pange-Wand I knot		Air Temperature	rature	ALE Density	nsity	Proj. 4t.	. of 15g	Range	Def1.
	le meters	ETTHE	m118	ĕ	Inc	Head	1185	Dec	Inc	ğ	Inc	Dec	Inc	meters	meters
<del></del>	+-		90.	5.6	-5.3	7.	2.2	5.	·?	-2.0	3.0	-13	13	6	-
4	53.1	1.8	71.	10.2		°.	20:	. 2.1	2.1	6.1-	8.2	-18	19	-:-	7
6000	$oxed{igspace}$	3.2	. 23	17.1	-13.6	2.1	-1.9	6.4	8.4	-13.3	13.3	-11	18	25	
5000 141.4	1.4 34	5.2	. 34	:7.2	-16.8	0.7	-3.6	28.5	ec. 1.	-30.0	31.6	-11	12	7.1	7
1000 208.2	3.2 2.	8.7	59'	19.7	-19.3	7.1	-5.0	-9.9	6.5	-43.8	42.9	-	5	3,	٠,
4	<u> </u>	11.0	75.	21.6	-21.2	11.1	-9.2	-5.2	σ <sub>:</sub>	-54.7	51.9	3	;-	7.5	T.
14000 392	392.2 18	14.9	.62	23.3	-22.9	15.8	-12.9	3.2	-6.0	-63.7	61.3	6	-6	4.7	∞
<del></del>	L	20.1	02.	25.2	-74.7	21.3	-16.9	11.5	-12.1	-73.1	73.6	17	-13	51	6
17000 602.2	10	23.9	27.	24.5	-25.8	24.3	0.61-	14.3	-14.3	.78.8	82.4	22	-18	57.	잌
+-	↓_	33.7	.82	28.1	-27.5	24.3	2.1.5	14.8	-15.6	-86.6	85.1	29	-26	58	≏
17000 598.2	3.2 12	53.1	11:3	28.1	-27.7	24.3	-:3.5	10.8	-12.5	-93.3	88.1	34	- 30	09	2
<del>  -</del>	5.1	53.3	1.24	25.9	-26.3	25.7	-72.0	9.1	-11.4	-87.8	85.0	36	-32	57	£
14300 1156.2	5.2 2.7	87.4	1.53	23.4	-22	23.8	-16.6	7.5	-10.1	-74.8	74.7	41	- 38	67	1.7
+	-	132.0	2.04	18.6	-17.5	20.02	-:1.2	8.0	-10.8	-58.3	61.3	09	-56	77	
10504 1250.3	5.0	0.861	2.49	13.1	-16.4	14.1	-: 1.2	8.8	-13.9	-58.3	48.2	1,1	-92	7.	2
-															
-									į						

Table A-12 M109A1, XM198 howitzers, 155mm, firing M483A1

	Bas	isic Pr	ic Projectile: M48	M483A1			ı	ਵੈਂ	Charge:	rge: 1 (XXIOS), (XXIOS) III. Also Currently Used for Shell:	ed for	Shell:				ı 1
Sou	rce: Con	monter	Source: Computer Statisticuis													
Ì	Elev. Corr.	Corr.	Azimuth Corrections	ections				Pange	Correct	Range Corrections (meters)	ers		h			rrors
Elev.	1 911		Drift Drift	Cross-Wind		Muzzle Velocity l meter/sec	Rangs 1 ci	Range-Wind I enot	Alr Tem	Air Temperature	A1F C	Air Density	<u> </u>			<u> </u>
1 5	meters		_	a. Is		Inc	Head Tail	7817	ğ	Inc	č	Inc	ě	tho Tho	meters	meters meters
17.8	<del> </del> —		0.2							 	$\perp$					
30			8.4		21	-21					4	1		-		
ફુ	-		6.6							_	$\dashv$	4				
1 9	009		11.1							_	_	1				
	200		17.3		33	-33					_	$\downarrow$		1		
	1000		27.7				_				-					
	1200		55.1				_				-	_				
	1245.4		76.0		22	-23							-		_	
							<u> </u>	_	_	_			ļ <u>-</u>			
	-					<u> </u>	-	-			-	_				
	-					<del> </del>	1_	_	_		-	_	ļ }	 		
	-					\ \ \		1	_	-	-	-	ļ 	_		
						<u> </u>	-	-		<u> </u>	-	-			 	
						<u> </u>	-	-			-	-	-			
	-					-	-	 <del> </del> -			-	-	-		_	
	-					  -	_	-	 <del> </del> -	_	1	-		_	 	

Table A-12 (continued)

Sauce,   Computer Stanistion   Alice Currently Used for Stalis   Prob. Errors			Basic P	Basic Projectile: M	H483A1				2	Charge: 2	2 (23.0), (253.0	(253.0	n/s)				1
12.00   17.1   1		Sour	- 1	r Simulation				ı		Also Cur	rently Us	ed for	5hell: .				1
214   2017   2018   2017   2018   2	Basic	Ü	Elev. Corr.		ections				Parge	Correcta	ons (mete	rs)		i		Prob.	Errors
17.8		3.ev.	l mal		Cross-Wind		elocity r/sec	Range-		Air Temp	oerature	Air D	nsity	Proj. M	t. of 15g Std.	. Range	2et1.
17.8   .3   .3   .3   .3   .3   .3   .3	—	111	neters	-	31:18	1 1	Inc	Head	[18]	ĕ	Inc	ě	Inc	Š	Inc	meters	me ter
300       4.8       26       -26         400       6.6       -26       -26         800       11.1       38       -36         1000       27.6       -36       -36         1200       51.1       -24       -24         1244.4       66.0       24       -24         1244.4       66.0       24       -24	228	17.8		.3													
600 11.1 38 -36 1000 12.4 38 -36 1244.4 66.0 24 -24 1244.4 66.0 24 -24	3318	300		8.4		2.6	-26										
600   11.1   38   -3¢   15.4   12.0   15.4   12.0   12.4   12.0   12.4	4133	00,		6.6								_					
15.4   38 -36   15.4   1600   27.6   1200   24 -24   1200   24 -24   1200   24 -24   1200   24 -24   1200   25 -24   1200   25 -24   25 -25   25	5228	009		11.1													
1200 31.1 1244.4 66.0 24 -24	5553	800		4,71		38	- 36										
1244.4 66.0 24 -24	-	0001		27.6													
1244.4	<u> </u>	1200		51.1													
	┼─	244.4		66.0		7.7	-24										
	-																
	<del> </del> 																
	-										·   						
	-																

Table A-12 (continued)

		Basic P	Basic Projectile: M483A1	14				₹	.ge: 3 C	Charge: 3 (32159), (270.1 m/r)	270.7	157				
<del></del> .	Sou	Source; Computer Simulations	Simulations				1	-	Alse Curi	Also Currently Used for Shell:	; d for ;	she11: _				ı
2	Basic	Elev. Corr.	Azimuth Corrections	rections				Pange	Correctio	Range Corrections (meters)	(8)				Prob. Errors	rrors
Range	Elev.	1 mil	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity 1 meter/sec		Range-Wind 1 knot		Air Temperature 10	erature	Air Density 10	nsity	Proj. ht	Proj. bt. of 15g Std.	Range	Def1.
Meters	mil:	meters	mils	mı is	ů	Inc	Head	1911	ě	Inc	Dec	Inc	ĕ	Inc	meters	meters
258	17.8		0.3													
1676	300		8.4		25	-25								†   		
4633	004		6.6													
5943	005		11.1													
6204	800		7.71		39	0١-										
2695	1000		27.7													
4327	1 200		9.08													
3898	1244.4		64.2		25	-25										
								_								
		·														
31	1 (01) 2	SAP PR (UT) 2780 Dec 75														

Table A-12 (continued)

		Basic ?	Basic Projectile:	- स्थ				<del>1</del>	rge: 4	Charge: 4 (XX164), (354,2 g/s)	2.420	(5/4				
	Poor	Source: Computer Simulations	r Simulations				1		Also Cur	Also Currently Used for Shell:	ed for	Shell:				ı
2	Basic	Elev. Corr.	Azimuth Corrections	rections				Range	Correcti	Range Corrections (meters)	rs)				Prob. Errors	rrors
Range	Elev.	ן שון	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity I meter/sec	/elocity :r/sec	Ranye-Wind 1 knot		Air Temperature	erature	Air Density	nsity	Proj. Wt.	. of 159 Std.	Range	i.
Meters	mils	meters	mals	m1.5	) 0	Inc	Head Tall	1187	Dec	Inc	Dec	Inc	o <b>e</b> c	Inc	meters	meters
436	17.8		0.3													
5634	300		4.7		18	-18										
6910	400		6.6		(22)	(-27)										
1798	009		11.4		(27)	(. 27)		_								
6816	800		18.0		87	٥, ا										
8474	(001		28.7		(28)	(8,-)										
£679	1200		91.6		(22)	(-22)										
5864	1244.4		63.4		19	-19										
				•												
							_									
						_										
SARPI-F	K (0T) Z	SARPAL-PR (UT) 2/00 Dec 75														

Table A-12 (continued)

		Basic P	Basic Projectile:	M483A.1				4,5	C'urge: 5	5 (XH164), (441		(s/E				
	Sour	Source: Computer Simulations	: Simulations				1		Also Cur	Also Currently Used for Shell:	ed for	Shell:				1
, ä	Basic	Flev. Corr.	Azimuth Corr	Corrections				P. Bange	Correcti	Range Corrections (meters)	ra)				Prob. Errors	rrors
Range	Elev.	l mil	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity l meter/sec		Range-Wind 1 knot	├──	Air Temperature	erature	Air Density I%	nsity	Proj. Wt	Proj. Wt. of 1 <u>Sq</u> Std.	Runge	Defil.
Meters	mils	meters	mils	rı. 1.s	Dec	Inc	Head	1187	Dec	Inc	Dec	Inc	Dec	Inc	meters	meters
899	17.8		0.3													
7328	300		5.4		(21)	(-21)										
8834	007		7.5									ļ				
10302	909		12.6				-								-	
11911	800		8.61		(28)	(-28)										
88201	0001		31.5													
8309	1200		56.5													
7505	1244.4		6.69		(61)	(-18)										
								,								
															-	
								-								
SUM	(101) i	SURM-TR (OT) : 768 Dec 75														

Table A-12 (continued)

				Errors	Pefi.	meters												Γ				T		T	-
				14 F	Range	meters meters		1		1			1	+	$\dagger$					_	$\dagger$	$\dagger$	+-	+	-
					1 P	Inc			1	1	$\dagger$	+	$\dagger$	-	1				/ 		T	$\dagger$		+-	-
					Proj. Wt. o	┝	$\vdash$	-	+	╁	+	+	+	+	+	+		-	_		-	-	-	-	_
	8)			┢		å	_	-	_	-	1					_		_		 					
	J.3 m/	r Shell			Air Density 10	Inc	_	$\downarrow$	-	_		-	_		1						_				_
	22, (59	lsed for				3	_	<u> </u>	_	-	1	1	_	_	$\downarrow$	1			_					<u> </u>	_
	(XY201E	ently C	, i		rature	Inc																			
	Charge: 6 (XM201E2), (59).3 m/s)	Also Currently Used for Shell:	Sange Corrections (meters)		Air Temperature 13	Dec							T			1					-		<u> </u>	-	-
	Char	2	30 300 87			<del> </del>		$\vdash$	-	-		-	-	+	<del> </del>	+	-				_	-	-	-	_
	į	f			kange-wind 1 knot	Fead Tall		+-	-	-	$\vdash$	<del> -</del>	-	-	+	+						-	-		_
				-		Inc			55	-28	<del> </del>	-29	-23	-	-	$\dagger$	-	-				-	↓ 	-	
İ				1 9	I meter/sec	-			<u> </u>	<u> </u>	-		-	-	-	-	_		_			_		 	1
				-!		ě		_	25	78		29	23	L						_					
	M483A1		Azimuth Corrections	Cross-Wind	1 knot	mı le		<u> </u>																	
	*	tions	uth Corn		Le fr					-					-		1	1				-			j
	Basic Projectile:	Computer Simulations	Azim	Drift	Corr. to Left	el tm	0.4	6.6	9.0	14.5	22.5	35.7	65.2	83.:											
	Basic F		Elev. Corr.	l mil		meters											1								4 5
		Source: _	=	├-		+	80	_			_			4.	_	-	+	4	_	_	-	_	_		
			Basic	Elev.		# B173	17.8	300	<b>*</b> 00	909	800	1000	1200	1244.4	_		_ _								(5)
				Range		Meters	7211	10452	12454	02671	15941	14954	1,603	10466											SARPA-PR (UT) 2766

Table A-12 (continued)

		d	M483A1	3A1				į	Charge: 7 (XM201E2) (667.5 = 1/s)	XM201E2,	(667.	1 1 (S)				
	Sou	Source: Computer	Computer Simulations				ì	~	Also Currently Used for Shell:	ently Use	ed for S	hell: _				1
		3.00	Azimuth Corrections	not ions				Range	Range Corrections (meters)	ns (meter	(F)				Prob. Errors	rrors
Range	Elev.	1 -11	Drift	Cross-Wind	Muzzle Velocity I meter/sec	elocity r/sec	Range-Wind 1 kno!:		Air Temperature	erature	Air Density	nsity	Proj. Wt.	of 1 Sq		Defil.
#eters	m418	meters	_	mils	1 1	Inc	Head Tail	T.i.i.1	Dec.	inc	ů Ž	Inc	ů	Inc	meters	meters meters
1478	17.8		7.0							[						
12398	38		7.1		23	-23										
14357	007		2.6													
17110	009		15.4													
18261	800		23.7		31	-31										
17238	0001		37.4									•				$\rfloor$
2 % 1	1200		69.69													
12110	1244.4		9.06		23	-23										
											 				_	
		-									 					
							_				   					
											<u> </u>					
	<u> </u>					_					_					
SARA	(OT)	SURPL-PK (01) 2/86 Dec 75														

Table A-12 (continued)

									ť	Charge:	8 (XY203E2), (801.6 m/s)	2). (80)	9.1	_			
1		Sou		er Simulations					•	1							1
1 mil   Drift   Cores-Mind   Muzik Volections   Cores-Mind   Muzik Volections   Cores-Mind   Muzik Volections   Cores-Mind   Muzik Volection   Cores-Mind   Muzik Volection   Cores-Mind   Mind   Cores-Mind   Muzik Volection   Cores-Mind   Mind   Mind								}		Atso Cur	rently Us	sed for ;	shell:				Į
1 mil   Drift   Cross-Wind   Muzzle Velocity   Sange-Wind   Air Temperature   Air Density   Pro). Wi. of 1 Sange-Wind   Decr. to Left   1 knot   1 mils   Dec   Inc   Dec	2	a le	Elev. Corr.		rections				Pange	Correcti	ons (mete	rs)				Proh	1
10.4   mils   Dec   Inc   Heed   Tall   Dec   Inc   Dec	Range	Elev.	l mil	Drift Corr. to Left	Cross-Wind 1 knot		/elocity	Range	-Wind	Air Temp	berature	Alr Der	nsity	Proj. W	. of 1 Sc	Range	Seti.
9.04 10.3 10.4 10.5 10.4 10.4 10.4 10.4 10.4 10.4 10.4 10.4	Meters	Н	Beters	mils	m11s		Inc	Head	_		1,20				, kg.		
8.0 10.9 17.5 25.6 29.6 80.4 116.4 116.4 116.4 116.4 117.4 118.4 118.4	2085	17.5		0.4								3	247	<u>کو</u>	Juc	meters	meter
10.9 17.5 25.6 29.6 39.6 80.4 10.4 116.4 (57) (78)	15537	300		8.0									1				
17.5 25.6 25.6 39.6 30.4 116.4 116.4 116.4 117.5 117.5 118.4 118.4 118.4 119.4	17790	00%		10.9													
25.6 39.6 80.4 116.4 116.4 (72)	21041	009		17.5									1			(65)	$\widehat{\mathbb{S}}$
39.6 80.4 11h.4 1.1	22603	800		25.6					T			1	1				ક ક
80.4 11h.4 11h.4	21711	0001							1				7				3
116.4	3			27.0		1			1					,	_	(22)	(18)
116.4	61	377	1	80.4												(57)	(17)
	15335	1244.4		116.4	_	···-			_								
					•								1				
			-		1								1		1	1	
									+			1	1				
		-	<del> </del>			1		1	$\dagger$	1	1	$\dagger$	1				
						1		1	1			1	1				
	1	1	+			1											
	7	1								-		-					
	1	7											<del> -</del>				
	1	1										1	-		1	1	
								_				-	+	<b>†</b> -	+	1	

Table A-13 M109A1, XM198 howitzers, 155mm, firing XM708E2

	Prob. Error		Def.1.	meters												1						
		वा १ ३०		Inc																		
he 11:		Proj. Wt. of 1 lb Range		ပ္ခရိ																		
ed For S		Air Density	:	Inc														_				 
2 otly Us	ters)	ALK D		ě		_		_						<u> </u>	$\downarrow$		_	_				-
re 1 of 2. Also Currently Used For Shell:	ions (me	erature		Inc																		
Page 1	Range Corrections (meters)	Air Temperature	1	Dec																		
	Rang	Range-Wird	l knot	Ta1							 	 	 	-	+	 	_			 	_	
			_	read						ļ		_	_	_	1		_			-	-	
		Muzzle Velocity	l meter/sec	Ιβο																	 	\ \
				မိုင်								<u> </u>	_									
	9	Cross-Wind	l knot	mi 1s																		
Basic Projectile: XM708E2	4.00	Drift	Corr. to Left	HILS																		
Basic Pro)		I mil		meters																		
Basic Source: Computer Simulations		Range		meters	250c	4,200	2620	3600	5950	3800	7 100	6750	4350		6050	10050	6450	7950	12560	0 <u>.</u> 8		   -
CO		Basic Elev.		Bils	300	800	1244	300	800	1244	300	800	1244		300	800	1244	300	800	1244		
Source		e prage		!	791EX		:	XX164		:	XM164	m :	:	24164	77	-	:	X4164		=		

Table A-13 (continued)

Source	a i	ts_rer_st	Basic Pro Source:Com_uter_Simulations	Basic Projectile: XM708E2 tions	3E2					Page 2.	e 2 of 2 Also Currently Used For Shell:	tly us	ed For	3he11:		
																4
-	2.5		Elev. Corr.	Azimuch Colfections	rections				- Kange	Sange Corrections (meters)	Tons (me	ís I			;	rion. error
Charge	Slev.	Range	l m l	Orr. to Left	Cross-Wind 1 knot	Muzzle l met	Muzzle Velocity l meter/sec	Range-Wind 1 knct		Air Temperature	erature	Air D	Air Density 14	ě.	of 11b	Range Def1.
	mils	neters	meters	mils	mils	Dec	Inc	Head	7.011	Dec	Inc	Dec	Inc	Dec	Inc	meters
XX:201E2	300	11050														
:	800	16700														
-	1244	11650														
XX4201E2	300	13000														
	800	19 300														
	1244	12800														\
XX20 3E2	370	16480														
=	009	24150														
=	1244	16150														

M169A1, XM198 howitzers, 155mm, firing XM708E3 Table A-14

### Basic   Elev. Corr. Azimuth Corrections   Elev. Corr. Azimuth Corrections	:	:	
Basic   Elev. Coff.   Azimuti Coffections	Also Currently (Sed For Shell:	3111	
### Basic	Range Corrections (meters)	Prob.	b. Error
maters   maters   mil	Range-Mind Air Temperature Air Density	Proj. Wt. of 1 1b Range	oge Def1.
m.1 is         meters         mils         meter         inc           300         11000<	u man noc Inc Dec Inc	Dec Inc	meters
300 800 1244 300 800 1244	140.		
1244 1244 1244 1244 3E2 300 1244 1244			$\left  \cdot \right $
1244 300 800 1244 1300			$ \rangle$
300 800 1244 300 1244			$\langle   \rangle$
1244 300 800 1244			$\left\langle \left  \cdot \right  \right\rangle$
1244 300 800 1244		1	$\left\langle \left  \right\rangle \right $
300		1	
1244		+	$  \rangle$
1244			/[
			$\setminus \mid$
			$\setminus \mid$
			$\setminus \mid$

Table A-14 (continued)

			Pasic Pro-	Pasic Projectile: XM708E3	36.3					Page 1	%	14				
Sour		Source: Computer Simulations	mulations							, Y		tly Use	d For S			
	Batic		Elev Corr.	Azimuth Corrections	rections				Pange	Correct	Range Corrections (meters)	ers)				Prob. Error
Charge	Elev.	Range	l mil	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle 1 met	Muzzle Vel city l meter/sec	Range-Wind 1 knot	Wind	Air Temperature	erature	Air Density 10		Proj. Wt. of 1 1b	of 1 1b	
:	Et 18	Meters	Deters	mals	m11s	ě	Inc	Head	Tail	) on a	Inc	Sec	Inc	Dec.	Inc	neters
XM164 1	300	2460														
	800	4200														
	1244	2650						-								
x*164	300	C 28.0														
	800	5300														
	1244	3700							-							
xx164 3	300	4050							<del> </del>							
	800	6700														
r	1244	4300							<u> </u>							
XM164	300	6150														
*	900	0566											-			
Ŧ	1244	6400														
XM164 5	300	7900														
	008	12640						-								
	1244	8,00														
			•		-			-					_			
SARPA-FR (OT) 2769 Dec 75	(OT) 276	59 Dec 75														

Table A-15 M107 self-propelled gun, 175mm, firing M437A1, M437A2

		Bastc F	10 Projectile: 744	M437A2	}		1	Cr.o	-ge: 1 (5	Charge: 1 (510.5 m/s)						
	Sou	Source: FT1 5-A-1	A-1						Also Cur	also Currently Used for Shell:	ed for	S.c11:	¥437A1			
8	Basic	Elev. Corr.	Azimuth Corrections	rec: 107 s				Range	Correction	Range Corrections (meters)	ra s				Prob. F	Errors
Range	Elev.	1 57 1	brift Corr. to Left	Cross-Wind 1 knot	Muzzle Velocity I meter/sec	relocaty r/sec	Range-Wind 1 knot		Air Temperature	erature	Air Density	nsity	Proj. Wt.	. of 1 Sq	Range	1.0
Meters	FL 19	meters	Bils	M1.8	Sec.	7110	Head	_a11	Dec	Inc	caG	Inc	Dec	Inc	Dete-s	meters
2000	41.7	7,7	a,	70.	7.6	772-	۲:	2	s		1-1.7	1.7	ħ'-	71	22	÷
7000	92.1	36	1.8	5.	142	-13.5	1.0	6	-1.9	1.7	-6.6	6.8	-2-	24	20	
6003	154.6	29	3.0	7::	19.8	0.61-	2.3	-2.1	-4.0	3.3	-14.4	14.9	-29	30	15	1
8000	233.0	23	7.7	5	23.8	23.3	æ: .7	-4.4		7.	-23.4	22.5	-31	32	21	1
10000	328.:	15	5.6	<del>-</del>	26.3	-25.1	8.7	-7.6	7.8	-5.6	-30.)	28.н	-32	33	23	7
12300	443.1	16	7.3		28.8	-25.4	13.5	-11.4	12.2	-14.7	-36.8	35.4	-32	33	25	2
06671	599	10	10.0	ž.	1.5	-30.8	18.5	-15.3	2.1.6	-71.8	-44.2	43.8	-32	37	27	3
15100	774.1	4	14.7	64.	33.7	-32.7	18.8	-17.3	22.0	-24.0	-49.4	6.72	-21	33.	29	3
00071	1018.2	11	26.9	3/1.	32.9	-32.0	0.61	6.3	17.9	-19.3	-49.7	1.87	-30	31	29	7
00021	1151.7	19	47.6	26.	28.9	-28.0	17.0	-14.4	14.4	-16.1	-42.4	41.5	-25	28	27	'n
11900	1157.0	19	43.6	şŧ.	28.7	-27.7	14.9	1	14.3	-15.9	-42.0	41.1	- 26	28	27	~
						   				   	ļ 					
					   						ļ					
S. Mark	7 (10)	SURPLINE (OT) ZIEG TAG 75	1				]			   						

Company Service of the Service of th

Table A-15 (continued)

		Basic P	c Projectile: 19832	17.02			,	l do	charge: 2 (704,1 m/s)	704,1 m/	ا ا					
	Sou	Source: FT175-A-1					1	-	Also Currently Used	ently Use	d for S	for Shell: _	K437k)			
	Baqic	Elev. Corr.	Azimuth Corrections	rections				Pange	Vange Corrections	ns (meters)	(8)				Prcb. En	Errors
Range	Elev.	1.541	Drift Corr. to Left	Cross-Wind 1 knot	Wizzle Velocity l meter/sec	le Velocity meter/sec	Range-Wind 1 knot		Air Tempe	Temperature 14	Air Densi+y l•		Proj. Wt. 3 Sc	. of 15g	Range	Defl.
Meters	mils	Reters	mils	9118	o ac	Inc	Head	7411	Dec	Inc	õ	Inc	oec Oec	Inc	meters	meters
2000	21.5	120	٠.	70.	5.6	-5.3	.1		7	7,	-1.6	7.1	7-	7	24	-
0007	46.5	7.	1.2	60.	10.5	-10.1	.5	5	-1.7	1.6	-5.6	٤٠٤	[ f.	11	25	-
0004	7.9.	52	2.0	71.	16.9	7.7	1.3	-1.2	-3.8	3.5	-12.3	17.8	-12	12	27	2
8000	111.4	52	2.9	. 20	19.7	-18.2	2.4	-2.3	-6.5	6.1	-21.5	22.6	61-	11	31	2
0000:	154.2	77	0.1	:7:	22.2	-21.6	0.4	-3.5	6.6-	9.3	-32.9	35.0	4-	7	36	3
12000	205.6	34	5.3	35.	25.3	-24.7	6.0	-5.4	-13.9	۲۶.۲	-46.4	49.3	0	ĩ	42	3
14000	271.3	28	6.8	:43	28.3	4. 2-	8.8	-7.7	-17.5	13.2	-61.3	62.1	9	-5	67	4
16,100	350.0	23	8.5	0ξ.	30.8	-30.2	7.21	-:0.5	-17.3	9.3	-75.2	71.9	11	-10	55	4
18000	445.3	19	:0.5	٠٤.	33.0	-32.6	17.1	-14.0	-11.0	2.2	-84.2	6.62	71	-13	61	5
20000	565.3	14	13.1	64.	35.1	-34.5	23.3	0.81-	2.1	-6.4	0.46-	0.68	16	-15	65	ų
71000	6.1.9	::	5.91	191	36.6	-35.6	26.4	-20.3	10.5	-10.6	-95.5	0.92	19	-17	-53	۲۰
22100	801.6	7	7.61	7.2.	38.4	5.78-	26.4	-22.9	11.1	-14.0	-100.0	97.5	22	-20	69	œ
21000	1010.8	-	31.2	06'	÷0.4	6"()"-	5.45	6.22	4	-3.2	-112.4	102.5	23	Ş	۲:	10
20000	1075.4	07	3.3	46.	40.1	-34.9	27.3	0.45-	-3.6	ę. <u>.</u>	-107.8	102.7	22	-20	7.5	1.1
0018:	1130 6	2.7	52.6	1.10	37.6	-37.0	25.5	22.2	-6.0	1.3	-97.5	95.4	23	-15	69	=
				T												

Table A-15 (continued)

		Basic	Basic Projectile: M4	H437A2				िंह	Charge: 3 (914.4 =/3)	(914.4 =/	(2					
	Sou	Source: FT175-	'5-A-1						Also Cur	Also Currently Used for Shell:	led for	Shell:	X437A1			
48	Basic	Elev. Corr.	Azimuth Corrections	rections				Range		Corrections (meters)	rs)				Pr.b. E	Errors
Pange	Elev.	l mil	Drift Corr. to Left	Cross-Wind I knot	Muzzle l met	Muzzle Velocit/ l meter/sec	Range-Wind 1 knot	-Kind	Air temperature	erature	Air Density	ensity	Proj. Wt.	5. of 1 Sg	Range	2.5
Meters	21.1s	Beters	mals	m, is	o di	Inc	Head	7411	ŏ	, nc	i. A	Inc	υěα	fac	meters	meters
0007	26.8	132	80.	90.	8.2	-8.0	7.		-1.5	1.4	-4.7	4.8	-15	15	15	2
8000	61.9	66	6.1	.13	15.0	-14.6	::	-1.4	-5.8	5.5	1.08.5	19.3	-20	=	18	4
1 2000	109.5	7.2	3.5	.21	70.4	-20.0	3.7	-3.4	-12.7	11.9	7.07-	43.0	-16	92	22	4
16000	175.1	52	5.5	۱۲.	25.1	-24.4	7.1	4.4	-21.5	70.3	-69.3	74.8	-	S	28	8
20000	265.8	38	8.3	.43	30.0	-29.3	6.1	-10.3	-32.1	29.3	-103.9	111.8	13	==	ž	0.7
24000	385.3	30	11.9	.5.	36.3	-15.2	17.9	-15.5	-42.3	7.7.	-142.3	149.2	28	-25	3,7	12
26000	456.9	26	14.2	. 59	40.4	- 39.0	21.2	F18.3	8.74-	36.8	-162.5	172.6	34	2	67	2
28000	538.2	23	17.0	٠٠,٠	46.0	-43.8	24.6	-21.1	-54.6	43.4	-184-3	204.7	7.5	-38	55	1.5
30000	633.5	61	20.8	. 613	53.4	-50.1	28.0	-24.0	-62.5	54.4	-208.3	240.4	47	-43	5	
32000	764.1	=	26.9	72	66.7	-58.5	30.5	-26.9	-72.1	64.5	-234.0	244.6	87	277	7.2	70
32800	871.0	S	32.5	. 70	68.1	-63.1	30.5	1.85.1	-76.4	54.2	-245.0	244.6	777	07-	7.2	20
32000	1036.0	51	41.7	:8:	67.9	-67.3	30.5	6.01	8.44-	33.9	-231.8	344.6	57	-20	97	87
30000	1120.5	33	57.4	06.	65.3	-64.5	34.5	78.7	-51. i	43.7	.214.5	221.8	21	-16	7.5	ıε
28700	1156.3	07	75.8	¥6.	63.2	-61.9	31.9	-26.8	-50.8	44.1	-203.1	215.6	20	-16	23	32
						_										
SKR - F	SARPIL-FR (CT) 2760	6d Dac 75					1					1				7

Table A-16 M110 self-propelled howitzer, 8-inch, firing M106

			Basic P	Basic Projectile: MIO5, Fuze M557	5. Fuze MSS.			ı	, C	arge. 1	Charge, 1 (249.9 m/s)	(s)					
Corrections   Parish Corrections (Detects)   Corrections (Detects)		Sou	- 1							A So Cur	rently (is	ed for	Shell:	M426			1
Electronic Attention								,		i							ı
Corr. to Left   Livit   Libert/Sec   Livot   Libert/Sec   Livot   Libert/Sec   Livot   Libert/Sec   Livot   Libert/Sec   Livot   Libert/Sec   Livot   Libert/Sec   Livot   Libert/Sec   Libot   Libert/Sec   Libert	<u>.</u>	<b>**</b> 1c	Elev. Corr.	Azimuth Cor	rections				Range	Correcti	ons (mete	rs)				Prob.	rrors
1.1	Range	Elev.	1 mil	Drift Corr. to Left	Cross-Mind 1 Arit	Muzzle V I nete	/elocity ir/sec	Range 1 kr	-Kind	Air Temp	erature	A11 3	ensi ty	1	std. S		Def1.
1.1	Meters	$\vdash$	meters	Eils	M118	ĕ	Inc		7411	ű	Inc	Š	Inc	š	Inc	meters	Meters
2.3 .0h   1h.3   -14.4   1.3   -2.3   0   0   -1.8   1.8   -20   21   10    3.6 .10   24.0   -21.5   1.7   -1.4   0   0   -1.7   1.7   -29   30   12    5.8 .14   31.4   -28.1   1.7   -1.4   0   0   -1.7   1.7   -29   30   12    9.0   .19   39.4   -13.4   2.1   -1.8   0   0   -4.7   4.8   24    14.6   .2h   39.0   -13.7   3.3   -2.9   0   0   -6.1   5.0   -2.2   23    37.3   .41   38.0   -13.7   3.3   -2.8   0   0   -5.3   5.2   -35   36   19	0001	82.0	12	-:	.θ.	8.3	-7.4	-:	7	0	٥	2	.2	Ę	=	80	۰
3.8 .10 24.0 -21.51.6 0 0 -1.7 1.7 -29 30 12  5.8 .1. 31.4 -28.1 11.1 0 0 0 -1.0 1.0 1.7 38 16  9.0 .19 38.4 -34.6 2.1 -1.8 0 0 -4.7 4.8 -44 45 21  14.6 .2h 39.7 -38.3 2.h -2.3 0 0 0 -6.0 5.9 -48 48 24  37.3 .41 38.0 -31.7 3.3 -2.9 0 0 -6.1 6.0 2.2 33 36 19	2000	169.5	11	2.3	40.	16.3	٠١٠.	7.	-	0	0	8:	α.	0.7-	2.1	01	-
5.8       .11-       31-4       -28-1       11.1       -11.1       0       0       -3.0       33-1       18       16         9.0       .19       38-4       -13-6       21-1       -11.8       0       0       -6.7       4.6       -24-4       45       21-1         14.6       .2h       19-7       -18-3       2.h       -2.1       0       0       -6.0       5.9       -48-4       48-2       24-1         37.3       .4l       38-0       -13-7       2.h       29       0       0       -6.0       5.9       -48-3       24-1         49.3       .5l       31-2       0       0       -6.1       6.0       -12-2       43-1       24-1         49.3       .5l       31-2       0       0       -5.1       5.2       -13-3       35-1       19-1	3300	266.6	10	3.8	01.	24.0	-21.5	<i>'</i> :	\$ .	0	٥	1:	<u>  ':</u>	-29	2	2	-
9.6 . 19 38.4 - 14.6 2.1 -1.8 0 0 -4.7 4.8 4.8 21 14.6	4000	381.0	8	5.8	-:	31.4	-28.1		-1.1	0		-3.0	3.0	-33	200	2	
14.6       .2h       19.7       -19.3       2.h       -2.1       0       0       -6.0       5.9       -48       24       28         33.3       .4l       38.0       -13.7       3.3       -2.9       0       0       -6.1       6.0       -42       43       23         49.3       .5l       31.8       -29.2       3.3       -2.8       0       0       -5.3       5.2       -35       36       19         -       -       -       -       -       -       -       -       -3       36       19         -       -       -       -       -       -       -       -       -       -3       36       19         -	2000	536.5	\$	9.6	61.	38.4	- 34.6	[	α.		0	16.7	4.8	75-	.3	21	۲.
35.3 .41 38.0 -13.7 3.3 -2.9 0 0 -6.1 6.0 -42 43 23 23 49.3 .51 13.8 -29.2 3.3 -2.9 0 0 -5.3 5.2 -35 36 19	2660	729.1	2	14.6	٤.	, of	- 18.3	•	-2.3	0	0	-6.0	5.9	87-	Œ.	24	· .
40.3 3.5 2.8 0. 0 0 -5.3 5.2 -35 36 19	2000	1035.4	\$	32.3	-71	38.0	-33.3	3.3	9 : 7	0	С	- <del>-</del>	0.6	-42	5	23	_
	4200	1164.1	,	49.3	.53	8.15	2.8.7		8:	0	0	-5.3	5.2	-35	ž	6]	-3
																	ļ

Table A-16 (continued)

Basic   Elev. Cotr.   Azimuth Corrections			5	Charge:	(5/00						ı
Elev. Corr. Arimuth Corrections   Elev.   I mai   Dirit   I knot		1	[Z	Also Currently Used for Shell:	y Used	for Sh		M426		ŀ	1
Elev. I mil Drift Gross-Wind i knot mils mils mils mils mils mils mils mils		μ 	Ange Co	* ange Corrections (meters)	meters)					Prob. 1	Errors
139.7   14   1.1   .03     139.7   13   2.3   .06     217.5   17   3.7   .08     200.9   9   7.5   .15     100.1.9   6   10.7   .20     1161.0   9   46.3   .54     1161	Muzzle Velocity I meter/sec	Range-Wind 1 knot		Air Temperature	·	Air Density	<b></b>	Proj. Wt. 4 Sq	of 15g Std.	Range	Pefil.
139.7   13   2.3   .05     139.7   13   2.3   .06     217.5   17   3.7   .08     304.6   11   5.4   .12     407.9   9   7.5   .15     547.9   6   10.7   .20     1021.9   6   31.4   .41     1161.0   9   .46.3   .54     1161.0   9   .46.3   .54	Dec Inc	Head Tal.	$\vdash$	Dec Inc		J J	Inc	$\parallel$	Inc	meters	meters
139.7   13   2.3   .06	b.8	-:	1	0	-	2	.2	-12	12	8	٥
217.5 12 3.7 .08 304.6 11 5.4 .12 407.9 9 7.5 .15 547.9 6 10.7 .20 707.5 3 1526 1161.0 9 46.3 .54	14.8 -13.3	~.	7	0	-	17	15	-23	23	6	0
304.6     11     5.4     .15       407.9     9     7.5     .15       547.9     6     10.7     .20       707.5     3     15.4     .26       1161.0     9     46.3     .54       1161.0     9     46.3     .54	21.8 -19.7	9.		0 0	<u> </u>	-1.7	.:	-33	33	7.	-
547.9 9 7.5 1.15 547.9 6 10.7 .20 707.5 3 152h 1021.9 6 31.4 .41 1161.0 9 .46.3 .54	28.5 -25.8		-1.0	0 0	<u> </u>	-2.9 2	2.9	-42	42	71	-
1021.9 6 10.7 .20 707.5 3 152h 1021.9 6 11.4 .4i 1161.0 9 .46.3 .54	35.0 -31.7		-1.5	0	<del>                                     </del>	-4.5 4	4.6	-50	5.1	89	-
1021.9 6 31.4 .41 1161.0 9 .46.3 .54	-1.2 -37.5	.;	2.2.2	0	<del> </del>	-6.5	6.6	-58	8	22	7
1161.9 6 11.4 .41	12.4 -40.8	3.2	σ. ;;	0	-	-8.0	6:	-61	62	25	2
1161.0 9 46.3 .54	40.8 -36.6	3.9	-3.5	0 0	<u>'</u>	-8.1	8.1	75-	3.6	24	۳
	33.0 -30.4	3,9	-3.4	0 0	<u>'</u>	-7.0 7.	7.0	-45	97	21	~
			-				_				
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				-			-				
						-	-				
		•							_		
							-				

Table A-16 (continued)

		Basic	Basic Projectile:	4106, Fuze M557			1	ਲੇ	Charge: 3	3 (304.8 m/s)	(S/L					
	Sou	Source: FT8-J-4					]		Also Cur	Also Currently Used for Shell.	sed for	. 11-48	977×			i
																1
2	Basic	Elev. Corr.	Azimuth Corrections	rections				Pange	Correcti	Range Corrections (meters)	ers)				Prob. F	Errors
Range	Elev.	ודש ן	Orift Corr. to Left	Cross-Wand I knot	Muzzle I net	Muzzle Velocity I meter/sec	Range-Wand 1 knot	-Wand	Arr Temp	Temperature	Air D	Air Density	Proj. W	Wt. of 139	Range	ğ
Meters	B1.5	meters	mils	a; ls	Sec	Inc	Head	Tail	ě	Jac	٤	١		sta.		_
1000	55.0	20	8.	:0:	2.9	-5.3		-	9	-	<u> </u>	<u></u>		Ju T	meters	ä
000:	8:211	1:	9.1	.05	12.9	-10.7					· ·	7	71-		۵	0
3000	174.3	1.5	2.6	80	18.9	> 51-	,	:		,	°.		57	24		-
D007	241.0	1	,	1 5			;	P	3.0	٩	9-	9.7	-33	35	2	-
900	2 1	: :		2	8.77	-20.3	3.0	0· 1-	6.6	۲. ۱	-2.8	2.9	-43	4.5	Ξ	7
3000	313.4		5.0		30.5	-25.2	œ.	-1.5	7.5	8	4.4-	4.4	-52	75	==	7
0009	401.9	10	5.6	.16	35.1	-30.1	5.3	-2.1	8.3	6.	, 4.	,	1,40	];	1	
1000	512.0	<b>6</b> 0	0.6	07.	41.6	-34.9	6.5	-2.8	8.6	6.	8	4	84	3 F	=   ;	٠ ،
8000	721.3	Ε.		-   °	,		1-	+							7	٦
1 5	1			†	┪	2	8.9 B.9	8 - 3	8.3	ω.	-11.1	11.2	9:-	7.8	26	4
+	1033.0	27	35.0	۶۶۰	41.3	-35.4	6.1	-4.5	6.3	9	-10.9	8.01	99-	69	72	~
0009	1164.8	01	8.65	.55	٤٠.٤	- 30.3	9.6	-4.3	5.3	s:	-9.5	9.5	-56	58	72	-
7	1							-								•
7							-									
														+	†	
	-			-			<b></b>	+							1	
	-					+	+	1				1	1	1	+	
+	+			+	+		+	1	1					_		
$\dagger$	+	+			1		+	+								
_	_		_	_		_		_				t				

Table A-16 (continued)

			ic Projectile: <u>Mido, Fuze Moo.</u>	יכלה אבויז הפנ			1	€	Jarge:	Charge: 4 (350,5 g/s)	(\$/2)					ļ
	Sou	Source: FT8-J-4					l		Also Cur	Also Currently Used	sed for	for Shell:	M426			1
2	Resic	Elev. Corr.	Azimuth Corrections	rections				Punge	Correcti	Runge Corrections (meters)	rs)				Prob. 1	Frrors
Pange	Elev.	ן שין	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle /	Muzzle Velocity I meter/sec	Range	Range-Wind 1 knot	Air Tem	Air Temperature	Air D	Air Density	Proj. W:	Wt. of 1 Sq	Range	Def1.
Meters	mile	meters	mils	mils	Dec	Inc	Head	7411	Š	Inc	S S	Inc	) Se	Inc	meters	meters
1000	43.0	77	1:	90.	6.4	1.7	77.	ĵ.	σ.	-1.5	ı.	<u>"</u>	=-	OI	07	
2000	90.2	20	1.4	11	8.1	9.7-	1:6	-1.	4.1	-4.7	- i.s	-7	-16	91	30	
3000	141.0	19	2.2	, 14	10.4	1.01-	3.5	-3.3	9.1	-9.1	-2.7	2.6	-20	30	10	_
4000	195.3	81	3.1	.11	12.5	-12.0	8.8	-5.0	14.9	-13.8	-4.1	3.9	-22	23	Ξ	61
2000	253.6	16	4.1	.19	14.6	-13.7	8.0	\$.6-	20.6	-18.1	-5.	5.6	-25	25	12	~
9009	317.1	15	5.3	12.	17.0	-15.6	10.2	-8.3	25.5	-22.0	1:2-	7.6.	-27	78	1.4	7
7000	389.7	13	6.7	. 24	9.61	-17.7	12.1	9.6	29.5	-25.2	-10.0	10.0	6.1	30	17	_ ~
8000	473.7		8.6	.7.	22.6	-20.1	13.7	-10.4	32.7	-27.8	-12.7	12.7	-3.	33	20	3
0006	588.3		11.5	.31	26.0	-22.8	14.4	-12.6	34.7	-29.7	-15.7	15.9	-34	3¢	24	7
9700	761.2	2	17.2	.37	27.9	-25.1	14.4	L12.6	34.7	-30.4	-18.1	17.9	-37	36	3,4	
9006	993.1		30.2	.50	27.8	-24.8	14.2	-10.1	31.5	-25.2	-18.2	17.8	-36	28	28	9
8000	1103.6	=	41.3	19.	25.1	-22.2	6.11	0.6	27.5	-22.2	-16.4	16.1	-32	35	25	۲۰.
300	1163.1	13.	50.3	69.	22.9	-20.2	10.9	-8.3	25.0	-20.2	-15.1	1.4.9	-29	ā	77	_
					-											
	<u>†</u>															
													1			
	_							- 					j-		t	

Table A-16 (continued)

				1661			1	દં	. : e6.10	Charge: 5 (420.6 m/s)	n/s)					
	Sou	Source: F:8-J-4					1		Also Cu	Also Currently Head for one	7		90 7 m			1
										, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	שמם נסו	Shell:	27.			ı
2	Besic	Elev. Corr.	Azimuth	Corrections		i		Pange		Corrections (meters)	ers)					
Renge	Elev.	1 211	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle 1 Det	Muzzle Velocity I Deter/sec	Range	Range-Wind	Air Tem	Air Temperature	1 7	Density	Proj. *	Wt. of 1 Sq	. 100 200 200 200 200 200 200 200 200 200	Errors
Meters	2118	metors	mi.s	31.3	į į	The	, 1	TO.	1				4 Sq	Std.		
1000	30.0	31	4.	ŧö	7		ne an		Š	500	Ř.	Inc	Sec.	Irc	meters	meters
2000	64.2	2.7	8.	<u>:</u>	3. 3.	7.7-	-	;	۲. ا		9	ŝ.	6-	6		0
3000	103.1	7.6	1.3	31.	12.2	-11.8	-	? .	0.	ء   <u>.</u>		2.3	-16	91	7	-
7007	146.8	22	5:1	. 24	14.5	. 16					8.7	· , ;	-20	R	٥	-
2000	194.6	50	2.6	. 28	16.2	-16.2	4.2	2.4	·	9	4-7-6	7.1	-22	23	=	7
0009	264.4	61	3.3	15.	17.6	-17.6	4.6	7	2 -	2 -		, , , , , , , , , , , , , , , , , , ,	£7-	24	2	~
2000	302.4	17	4.2	£.	18.8	-18.8	8.8	-8.0	6.0	-117		77.7	27.0	72	7.	~
9000	363.3	9	5.1	1	1 8	3	- 1	+				,	77-		9	~
9006	\$31.5	41		?   ?	0.0.	$\top$	: Г	-	21.7	-22.4	-16.5	16.0	-23	24	17	
00001	7 65	:   =	a	eř.	31.5	-21.2	13.4	6.11.9	26.2	-26.4	-19.5	19.2	-22	23	702	-
9		=   '	6.3	. 42	33.3	23.5	15.4	-113.6	29.6	-29.8	-23.0	22.9	-21	22	77	'n
3 5	170	_	11.1	97.	25.4	-24.5	8.91	15.1	32.0	-32.5	-27.0	27.2	<u>ء</u>	12	26	_ ~
00011	6.74/		15.2	.52	26.2	-25.8	16.8	0.41-	32.2	-33.7	-29.7	28.8	-19	21	27	.   .
11000	976.8	80	27.9	.67	26.2	-25.3	16.8	14.1	1.2	-29.8	- 30. 7	7 00	٩	}	1	Ţ.
100001	1078.4	12	38.0	8:	24.1	-23.1	15.5	-13.0	23.0	7	, 8,	, ,	2 2	3   3	28	
8900	9.6511	15	50.6	16.	21.5	-30.6	14.2	+-				24.5	9 7	× ×	36 26	∞   :
				-			1	+	1				:	:	;	,
-	+	+-		+	+	+	$\dagger$	$\dashv$	1		7	$\dashv$				
_	_	_	_			-	•	-	-		•					i

Table A-16 (continued)

	nos	Source, F78-7-4	ojectile:				1	-	Also Curr	Currently Used for Shell:	ed for	Shell: _	34.26			
	- 1		4	e do i to a ra				Range	Corrections	ns (meters)	rs)				Prob. E	Errors
	Basic	Elev. Corr.	<u> </u>	Cross-Wind	Muzzle V	Plocity	Range-Wand	Kind	Air Tempe	Temperature	ALT De	Density	Proj. Wt.	of 1 <u>Sc</u>	Range	Defil.
Range	Elev.	1 441	Corr. to Left	1 knot	1 meter/sec	r/sec	ı kn	١	=		-				Te to 7 a	peters
2 4 4 4	9118	meters	BAls	m, 1s	Dec	Inc	Head	Tail	Š	Inc	ğ	ou I	ĕ	, nc	200	
900	-	5.7	\sigma	70.	0.4	-3.7	7:		1	۲.	5	°:	8-	80	_	۰
2001	77	9	0.1	60.		-7.2	E.		9	٠.	-2.1	2.1	-13	Ξ	۰	0
				]	9	-10.4	۲.	ç	-1.3	-:	-4.6	4.7	-17	17	80	1
3000	7.1	~	9.1				Î-	· ·	-2.2	1.9	-8.1	8.3	61-	19	01	7
0007	101.6	31	2.3	D,:	,						2	,	01-	2	_=	-
2000	136.2	í,	3.0	.26	16.4	-15.9	2.1	6.1.	-3.1	6.1	7   .	;	;			
9004	Y Y	4,0	3.9	.31	18.4	-18.0	3.3	-3.1	-2.8	7.	-16.5	16.1	-18	19	15	-
2000		, ;	5.0	.36	20.0	-19.6	5.0	-4.5	4.1	-2.6	-20.3	19.3	-17	18	16	7
200	2.61.	;   ;		07	21.2	-26.9	7.1	-6.2	3.2	9.4-	-23.6	22.2	-16	21	1.8	7
00Ca	2.63	4		1	77	-22.0	7.6	1.8	8.3	-11.3	-26.6	24.8	-15	91	61	2
0006	319.7	81	7					5	- 31	-16.2	-29.3	27.5	-13	5	20	_
00001	376.9	_1_	8.8	47.	13.1	6.57-	,					+-	]:	2	7	
11000	-140.2	15	10.5	67	24.0	-23.8	14.5	12.2	20.0	-21.0	-32.1	_	71-	2 3	; ;	\\
1 2300	\$12.5	2	12.5	.52	25.3	7.45.1	16.8	14.2	24.7	-24.6	-35.3	35.3	6-	2	į	
200	404	6	15.4	95.	6.97	-26.2	19.2	6.91	26.7	-27.2	0.07-	40.5	-1-5-	7	× 1	7
	+	,	21.0	£8.	28.1	-27.7	19.2	17.5	27.1	-29.0	-45.0	44.1	-2	7	25	3
	╅╌		97	86	27.6	-26.7	19.3	7.7	24.5	-25.4	-46.5	77.77	-1	2	3.6	٥
1 3000	1083	-	41.8	76.	3.3	-24.8	18.5	-16.3	22.2	-23.3	-43.2	41.6	0	2	7.7	٩
	- 1	_		1.06	23.2	-22.4	1:3.5	-15.3	6.61	-21.0	- 39.1	37.8	0	. 2	22	٩
10801	1158.1	91	300.													

Table A-16 (continued)

#10.   21ev.   1 m.   1 m.   58   118.7   36   146   118.7   36   1479.3   19   19   19   19   19   19   19   1		Sour	Source: FT8-J-4	Pro)ectile:						Also Curr	Also Currently Used for Shell:	d for S	hell: _	H426			1
Electronic   Control			- 1						Range	Correctio		·					rrors
Martin   M	Bas	i.	Zlev. Corr.		rect rous												3
mile         Dec         lied         Head         Tail         Dec         Inc         Ope         Inc         Ope         Inc         Ope         Inc         Ope         Inc         Ope         Inc         Ope         Inc         Inc         Ope         Inc	-	Elev.	1 m 1	Drift Corr to Left	Cross-Wind	Huzzle V l mete	elocity r/sec	Renge.		Air Temp	erature	Air Der	ısity	Proj. Wt	std.		Set I.
11.1.   14.   14.   1.1.   1.1.   1.1.   1.1.   1.2   1.2   1.2   1.2   1.3   1.4   1.1	1	11 L	Deters	m118	#11#	υğ	Inc		Tail	Sec.	nc	Dec	Inc	Dec.	Inc	Beters	Meter
69.9         46         1.2         1.15         11.4         .9         -7.9         -7.0         1.9         -7.3         7.4         -19         20         11         1           118.7         36.9         46         1.2         -11.4         .9         -2.0         -4.5         4.2         -16.1         16.9         -19         20         16         2           182.0         28         3.2         -15.9         -1.5         2.2         -2.0         -4.5         4.2         -16.1         16.9         -19         20         16         2         -16.1         16.9         -19         20         16         2         -16.1         16.9         -17.0         -19         6         -2         -16.1         16.9         -16.9         -19         16         2         -16         16         2         -16         17         -16.1         -17.1         -18         -16         -16         -16         -16         -16         -17.1         -16         -17.1         -16         -17.1         -17.2         -17.1         -16.2         -17.1         -16.2         -17.1         -16.2         -17.1         -16.2         -17.1         -16.2         -17.1	000	1.	85	۶.	.07	4.9	-6.1	.2	2	5	.5	-1.9	1.9	-13	13	٥	7
118.7         36         2.1         .24         15.5         -15.9         2.2         -2.0         -4.5         4.2         -16.1         16.9         -19         20         16         2           182.0         28         3.2         2.0         -19.6         4.3         -3.8         -7.1         5.1         -17.5         27.9         -14         15         19         2           182.0         28         3.2         2.2         2.2.4         7.7         -5.6         -5.1         -9         -14         15         19         22           362.1         2.2         2.2.4         7.7         -5.6         -5.1         -9         -9         -9         10         22         -9         -16.1         15         -9         10         22         -8         -7         -7         -46.5         23.7         -9         -16.1         10         22         -9         -16         -5         -9         -10         22         -8         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9         -9	7000	6.69	97	1.2	\$1.	11.9	-11.4	٥.	6.	-2.0	1.9	-7.3	7.4	61-	20	11	-
192.0         28         7.1         5.1         57.5         27.9         -14         15         19         2           182.0         28         3.2         -23.4         4.3         -3.8         -7.1         5.1         -24.5         17.5         -5.1         -9         -9         10         22           380.1         19         6.9         .52         24.7         -24.4         17.2         -10.1         2.8         -7.0         -46.5         43.3         -9         10         22           479.3         15         9.6         .52         24.7         -24.4         17.2         -10.1         2.8         -7.0         -46.5         43.3         -9         6         24         24.4         17.2         -10.1         2.8         -7.0         -46.5         43.3         -9         6         24         24.4         -14.2         14.6         -16.9         -53.1         49.7         0         24         24         24.4         -14.2         14.6         -16.9         -16.3         40.7         0         24         24         24         24.1         -16.2         43.1         9         24         24         24.1         24.1	500,		1 2		.24	16.5	-15.9	2.2	-2.0	-4.5	4.2	-16.1	6.91	-19	20	16	~
262.3         22         4.9         7.7         -5.6         -5.1         .9         -38.2         36.5         -9         10         22           262.3         22         4.9         7.7         -5.6         -5.1         .9         -38.2         36.5         -9         10         22           350.1         19         6.9         .52         24.7         -24.4         17.6         -14.2         14.6         -7.0         -46.5         47.3         -5         6         24           439.3         15         26.3         -26.0         17.6         -14.2         14.6         -5.0         -59.8         67.6         67.5         67.7         24.1	2002	182		3.2	.35	20.2	-19.6	4.3	-3.8	-7.1	5.1	-27.5	27.9	-14	15	19	2
350.1         19         6.9         .52         24.7         -24.4         17.2         -10.1         2.8         -7.0         -46.5         43.3         -5         6         24           4.9.3         15         9.6         .59         26.3         -26.0         17.6         -16.2         -16.9         -53.1         49.7         0         2         26           4.9.1         16.8         .56         26.3         -26.0         17.7         18.5         24.4         -26.1         -59.8         62.6         6         -4         27         26           794.9         3         16.8         .66         28.7         -27.7         22.1         18.9         -26.1         -59.8         62.6         6         -4         27           794.9         3         30.0         -29.3         22.1         -20.1         24.3         -26.5         63.8         17         -9         28         28           119.7         49.1         1.09         27.1         -26.2         12.2         16.9         -16.8         60.4         57.3         11         -9         24           119.3         2         2         2         2	00001	262.3		4.3	77.	22.8	-22.4	7.7	-5.6	-5.1	6.	-38.2	36.5	6-	01	22	e .
479.3         15         9.8         .59         28.3         -26.0         17.6         -14.5         -16.9         -53.1         49.7         0         2         28           479.3         15         9.8         .59         28.3         -26.0         17.6         -14.5         14.9         -59.8         62.6         6         -4         27           643.2         9         16.8         .66         28.7         -27.7         22.1         -18.5         24.4         -24.1         -59.8         67.6         6         -4         27           794.9         3         21.0         .74         30.0         -29.3         22.1         20.1         24.1         -24.5         63.1         -24.5         63.8         60.4         11         -9         28           981.1         10         35.0         -29.5         27.1         -20.1         20.2         -10.8         66.2         13         -11         -9         26           1119.7         25.0         27.1         -27.2         15.9         16.8         -62.8         60.4         11         -9         24           1119.3         21         25.0         21.4         -16.3<			_	6 4	.52	24.7	-24.4	12.2	-10.1	2.8	-7.0	-46.5	1	-5	و	54	3
643.2 9 14.8 .66 28.7 -27.7 22.1 18.5 24.4 -24.1 -59.8 62.6 6 -4 27 27 27 27 27 27 27 27 24.3 -64.5 63.8 12 -9 28 28 29.1 10 33.0 -29.3 22.1 -20.1 23.1 -24.3 -64.5 63.8 12 -9 28 28 29.1 10 33.0 .89 30.0 -29.5 22.1 -21.2 18.9 -20.2 -70.8 66.2 13 -11 29 26 119.7 19.9 49.1 1.09 27.1 -26.4 22.0 -15.8 16.9 -16.8 60.4 11 -9 26 1159.3 21 56.0 1.17 25.7 -25.0 21.4 -15.3 13.7 -15.6 -59.4 57.3 11 -9 24 24 25 25 25.1 25.0 21.4 -15.3 13.7 -15.6 -59.4 57.3 11 -9 24 24 25 25 25.0 21.4 -15.3 13.7 -15.6 29.4 57.3 11 -9 24 24 25 25 25 25 25 25 25 25 25 25 25 25 25	00071	330.1	_	8.6	65.	26.3	-26.0	17.6	-14.2	14.6	-16.9	-53.1	L	0	2	26	7
643.2       9       14.5       14.5       15.0       -29.3       22.1       -20.1       23.1       -24.3       -64.5       63.8       12       -9       28         794.9       3       21.0       .74       30.0       -29.5       22.1       -20.1       24.3       -64.5       63.8       12       -9       28         981.1       10       33.0       .39       30.0       -29.5       22.1       -20.2       -70.8       66.2       13       -11       29       26         1119.7       19       49.1       1.09       27.1       -26.4       27.0       -15.8       10.7       -15.6       -59.4       57.3       11       -9       24         1159.3       21       25.7       -25.0       21.4       -16.3       13.7       -15.6       -59.4       57.3       11       -9       24	3				7,4	28.7	-27.7	22.1	-18.5	24.4	-24.1	-59.8		٠	7-	27	2
981.1 10 33.0 .89 30.0 -29.5 22.1 -21.2 18.9 -20.2 -70.8 66.2 13 -11 29 1119.7 19 49.1 1.09 27.1 -26.4 22.0 15.8 14.9 -16.8 -62.8 60.4 11 -9 26 1159.3 21 56.0 1.17 25.7 -25.0 21.4 -15.3 13.7 -15.6 -59.4 57.3 11 -9 24	00091	10,00		21.0	7.74	30.0	-29.3	22.1	130.1	23.1	-24.3	-64.5	1 _	12	6	28	2
981.1 10 33.7 .637 55.0 15.8 16.9 16.8 -62.8 60.4 11 -9 26 1119.7 19 49.1 1.09 27.1 -26.4 27.0 15.8 14.9 -16.8 -59.4 57.3 11 -9 24 1159.3 21 56.0 1.17 25.7 -25.0 21.4 -15.3 13.7 -15.6 -59.4 57.3 11 -9 24	19800	5.36/			8	9	200 5	2, 1	1,,	18.9	-20.2	-70.8	1 _	2	17-	29	_
1119.7 19 49.1 1.03 27.1 25.7 -25.0 21.4 -15.3 13.7 -15.6 -59.4 57.3 11 -9 24 1159.3 21 56.0 1.17 25.7 -25.0 21.4 -15.3 13.7 -15.6 -59.4 57.3 11 -9 24	16000	981.1	$\perp$	33.0	6.		-26 4	22.0		14.9	F16.8	-62.8	1	=	6-	92	<b>~</b>
1159.3 21 56.0 1.17 25.7 -25.0 21.4 -19.3 13.7 -15.0 -59.4 57.5 11	14,000	1119.7		49.1	5									=	٩	7,	
	13200	1159.3		56.0	1.17	25.7	-25.0	21.4	~   -  -	13.7	15.6	- 29.4		:			<u> </u>
								_	_								
								-	<u> </u>		_						
							_	<u> </u>	-		<u> </u>	_					
					  -  -				<u> </u>	<u> </u>	  -						

Table A-17 M110 self-propelled howitzer, 8-inch, firing M424

		Basic P	ic Projectile: M424	5.6				<del>ද</del>	Charre: 1 (254 m/s)	254 m/s)						1
	Sou	Source: FT8-0-4					1		Also Currently Used for Shell:	ently Use	d for s		9422			
	Basic	Elev. Corr.	Azimuth Cor	Corrections				Pange	Range Corrections (meters)	ns (meter	(8)				Prob. E	Errors
Range	Elev.	l mil	Drift Corr. to Left	Cross-Wind I knot	Muzzle Velocity I meter/sec	/elocity ir/sec	Range-Wind I knot		Air Temperature		Air Density	nsity	Proj. Wt.	41. 1 30 .	Range	Def1.
Meters	2118	meters	mils.	F11.5	Dec	Inc	Head	Tail	Dec.	Inc	Dec	Inc	ည် သ	Inc	meters	meters
0001	79.4	12	1.2	90.0	3.1	-7.2	0.1	-0.1	0.0	0.0	-0.3	0.3	-4	.,	7	0
2000	0.991	11	2.5	0.11	15.7	7.7	0.5	7.0-	0.1	0.0	-1.1	1.1		7	9	,
3000	263.3	10	4.0	0.16	22.9	-20.6	1.0	8.0	0.1	0.0	-2.4	2.4	-10	10	8	2
0007	380.0	8	6.0	0.21	29.7	-26.8	1.8	-1.5	0.1	0.0	2.4-	4.2	-12	12	11	2
2000	543.8	۶	9.6	0.29	36.2	-32.7	3.0	-2.4	0.0	0.1	5.9-	6.7	-14	14	13	3
\$500	711.9	2	12.8	0.37	36.8	-35.6	3.6	-3.0	-0.1	0.2	-8.1	8.1.	-15	15	14	3
\$000	0.6101	2	23.8	95.0	35.8	-31.9	4.3	-3.8	-0.2	5.3	-8.2	8.2	-13	14	13	t,
SIRPL	3 (01) 2	SARPA-15 (01) 2760 Dec 75						]						] 	]   	

Table A-17 (continued)

		Zasto P	Basic Projectile: M424	4			1	Ē	Charge: 2 (359.7 m/s)	359.7 m/s	٦					1
	Sou	Source: FT8-0-4							Also Curi	Also Currently Used for Shell:	ed for	She11: .	H422			,
18	Baric	Elev. Corr.	Azimuth Corrections	rections				Panae	Corrections	ons (meters)	     @				Prob. E	Errors
Range	Elev.	1 mil	Drift Coir. to Left	Cross-Wind 1 knot	Muzzle Velocity 1 neter/sec	/elocity	Range-Wind 1 knot	-Wind	Air Temperature	l	Air De	Densi ty	Proj. Wt.	. of 1 1b	Range	Pefil.
Meters	#11#	meters	mils	B(18	ž	Inc	Head	Tail	Dec	Inc	ĕ	Inc	Dec	Inc	Beters	meters
1000	6.04	23	9.0	0.07	5.0	8.4-	6.0	4.5-	0.5	6.0-	-0.5	0.5	2	2	5	0
2000	86.3	21	1.3	C.12	9.6	-8.3	1.2	-1.3	2.6	-3.3	-1.7	1.7	-4	4	7	н
3000	135.9	19	2.0	5.17	11.5	-11.1	2.7	-2.6	6.0	-6.3	-3.3	3.3	-5	\$	6	-
0007	190.3	18	2.9	0.21	14.1	-13.5	4.5	-3.9	6.6	7.6-	-5.4	5.3	-5	5	11	2
2000	250.3	16	3.6	0.25	16.7	-15.8	6.4	-5.4	13.5	-12.2	-7.8	6.7	ŗ	9	13	3
9	318.1	14	6.4	0.30	19.3	-18.0	4.8	-6.8	16.7	-14.7	-10.8	10.9	9-	9	91	3
2000	397.2	11	6.3	0.34	21.9	-20.3	10.5	-8.3	19.3	-16.7	-14.2	1 4	-5	9	18	7
8000	496.7	6	8.1	07.6	24.8	-22.7	12.3	7.6-	21 3	-18.3	-18.0	16.0	-5	9	54	4
0006	656.7	4	11.5	69.0	27.9	-25.5	13.2	-11.2	21.7	-19.2	-22.5	24.0	5	5	77	5
9200	729.8	3	13.3	0.53	27.9	-26.1	13.2	-11.4	21.7	-19.2	-23.6	24.0	-5	5	77	5
0006	8.906	7	18.8	0.64	27.9	-26.6	13.2	-11.3	21.0	-16.8	-25.3	24.2	-۶	5	77	7
8500	5 . 0001	٤	,	0.72	27.5	-25.4	13.8	-10.8	18.9	-15.6	-24.0	23.6	4-	S	22	7
										L						
SAF T-P	1 (101) 2	SAR: 3-14 (01) 2/66 Dec 75							أ				]	1	1	

Table A-17 (continued)

Source:  Basic Elev. I mil  Beters mals meter  1000 17.7 54  2000 37.4 48  3000 84.9 37  5000 113.6 33		FT8-0-4										.,,,,,			
Elev. Elev. 17.7 17.7 37.4 59.7 84.9 84.9	w. Corr.					1		Also Cur	Also Currently Used for	ed for	Shell:	77 % W			,
17.7 37.4 59.7 84.9 113.6	mil	Azimuth Corr	Corrections				Runge	Corrections	ons (meters)	Î.				Prob. F	F.rror.
37.4 37.4 59.7 84.9		Drift Corr. to Left	Gross-Wind 1 knot	Muzzle Velocity I meter/sec	/elocaty	Range-Wind 1 knot	Wind	Air Temp	Temperature 13	Air 5e	Density 10	Proj. Wt.	. of 11b	Range	Defi.
	Meters		31.16	å	Inc	Head	Te.11	Dec	Inc	Dec	Inc	Dec	Inc	meters	meters
<del>  -   -   -   -   -   -   -   -   -   -</del>	24	0.3	0.05	3.6	-3.4	0.1	9.1	-0.1	0.1	-0.5	9.0	-2	2	11	0
<del>                                     </del>	87	0.6	60.0	7.0	-6.5	0.3	-0.3	5.3-	0.4	-2.1	2.1	7-	7	11	-
1-1-	4.2	6.0	0.14	6.6	-9.3	0.0	() =	.:.7	c	9.7	8.4	ئ.	Ŷ	12	~
<del>                                     </del>	37	6.1	61.0	12.6	-11.9	22	7.7	-1.8	1.5	-8.1	8.3	5	ç	13	2
	2	1.7	0.24	15.0	-14.2	2.0	-1.8	-2.5	2.0	-12.3	12.7	5-	s	15	2
971 0009	29	2.2	0.30	17.0	-16.3	3.0	-2.7	-3.2	1.9	-17.1	17.5	٠.	S.	1.7	~
7000 18%.7	25	2.8	0.35	18.7	-18.0	4.4	-3.9	-3.0	0.8	-22-1	22.0	-4	7	19	3
8900 225.5	23	3.4	0.41	20.1	-19.5	6.0	-5.3	-1.4	-1.3	-26.8	26.2	-3	4	23	7
9000 272.2	20	4.2	0.45	21.3	-20.8	8.0	6.9-	1.2	-4.1	-31.3	30.4	-2	~	77	٠
10000 342.1	18	5.6	0,50	22.4	6.12-	10.2	-8.7	6.5	-7.1	-35.6	34.8	-1	2	9;	5
11000 382.5	91	6.0	0.54	23.5	-22.9	12.6	-10.5	8.0	-10.0	-40.1	33.7	0	1	52	٥
12000 449.5	14	7.2	0.59	24.7	-24.0	15.1	-12.4	11.2	-12.7	-45.0	45.1	1	1-1	32	9
13000 530.8	=	8.8	0.64	26.0	-25.2	18.0	7.71-	13.8	-15.1	-50.5	51.3	3	-2	75	۲
6,44,9		11.2	17.0	27.9	-26.5	20.1	-16.5	15.6	-17.0	-56.6	59.2	5	7-	37	80
14500 768.8	3	77.71	62.0	27.9	-27.4	20.	9.71-	15.8	-17.5	-60.1	59.2	9	Ŷ	38	10
14000   948.0		20.5	0.93	28.4	-27.7	70.1	-19.7	14.3	-15.6	-64.5	59.2	9	-5	37	11
13500 1006.2	01	23.1	1.00	27.9	-27.0	20.4	6.96.7	13.4	-14.8	-62.5	60.3	9	5	35	1.2

Table A-18 M110 self-propelled howitzer, 8-inch, firing XM711

			Basic Pro	Basic Projectile: XM711						Page 1	-   -	-				
Soul	رو <b>ه</b> : وره	aputer Si	Source: Computer Simulations							ν1	Also Currently Used For Shell:	ıtly Us	ed For 8	She 11:		
	BASIC		Elev. Corr.	Azimuth Corrections	ections				Range	Correct	Range Corrections (meters)	ers)				Pr b. Error
Charge	Elev.	Range	ן הון	Orift Corr. to Seft	Cross-Wind 1 knot	Muzzle l net	Muzzie Velocity l meter/sec	Range-Wind 1 knot	Wind	Air Temperature IN	erature	Mr D	Air Density	Proj. Wt. of 1 1b Range	of 1 1b	Range Def1.
;	ails	meters	neters	mıls	n.15	ž	Inc	Head	Tail	Dec	Inc	ğ	Inc	Dec	Inc	meters
1-1K	853.3	54.38		20.6									 	8	-3	
:	9.5511	8517		46.5										2	-2	
11-2	853.3	6363		20.1										7	7-	
:	1155.6	4875		53.4								_		3	-3	
я1-3	853.3	7592		8.61								_		9	9-	
:	1155.6	5832		6.54										7	7-	
41-4	853.3	6086		8.61										6	o.	
=	1155.6	1612		45.5										9	9-	
5-1h	853.3	11300		21.2										15	-15	
	1155.6	8810		48.0								 		==	-11	
M2-5	853.3	11869		21.6										11	-17	
ž	1155.6	9273		49.7										1.2	-12	
H2-6	853.3	6617]		23.4										5.	-25	/
н	9.5511	7.1111		51.6										e e	-19	
42-7	853.3	19721		25.6										37	-37	(57)
:	1155.6	13719		54.8				_						30	-30	(41)
SARPA-FR	(OT) 276	SARPA-TR (OT) 2769 Dec 75														

Table A-19 M110 self-propelled howitzer, 8-inch, firing XM650E4

Starter   Computer Simulations   Starter   Computer Simulations   Starter   Control   Starter				Basic Pro	Basic Projectile: _XM650E4	75					Page 1	l of	~				
State   Stat	Sout	Con : Con	sputer Sin	mulations							Als	so Curren	:ly Use	d For Sl	e11:		
11.5.6   Marce   1 mail   Durite   Court to Lott   1 mail   Durite   Musale Wiscare   1 mail   Musale Wiscare   1 mail   Musale Wiscare   1 mail   Musale Wiscare   1 mail   Musale Wiscare   1 mail   Musale Wiscare   1 mail   Musale Wiscare   1 mail   Musale   Musale   Musale Wiscare   1 mail   Musale   Mus		9.83.0		Elev Corr.	Aziruth Cori	rections				Range	Correcti	ions (met	ersl				Prob. Error
auits         neters         auits         Dec         Tric         lead         Tail         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         Dec         Inc         <	Charge	glev.	Range	ן דשון	Drift Corr. to Left	Gross-Wand 1 knot	Muzzle l net	Velocity er/sec	Pange- 1 kn		Air Tenpe	erature	Air De		roj. Mt.	of 1 1b	
833.3       5490       23.3       31.8       3       -3       -3         833.3       6339       51.8       4       -4       -4         833.1       6339       40.7       6       -6       -6         833.1       9298       18.0       6       -6       -6         833.1       9298       18.0       6       -6       -6         833.1       1130       41.0       6       -6       -6         833.1       1187       41.0       6       -6       -6         833.1       1189       19.3       11       -11       -11         853.2       1189       45.5       118.0       17       -17         815.6       949       45.6       6       -6       -6         815.1       1120       46.6       7       -7       -7         815.2       1120       25.1       17       -17         815.2       1120       25.2       -25         815.2       1120       25.2       -25         815.2       1120       25.2       -25         815.2       1120       25.2       -25         815.2		81.18	meters	neters	m135	mı ls	ű	Z nc	-	Tail	)ec	Inc	၁မေ	Inc	Dec	Inc	meters
1135.6         4179         31.6         2         -2           833.3         6353         6353         4         -4         -4           1135.6         4824         6         -6         -6         -6           1135.6         5823         40.7         6         -6         -6         -6         -6           1135.6         383.3         2298         18.0         6         -6	1 - E	853.3	1		23.3										3	-3	
853.3       553.5       653.5       46.7       46.7       7.3       -4       -4<	<u> </u>	1155.6	<u> </u>		51.8										2	-2	
1155.6       4894       18.0       3       -3         853.3       1326       40.7       6       -6         1155.6       7124       41.0       6       -6         813.3       11307       19.3       6       -6         813.3       11876       43.8       19.7       11       -11         813.3       17216       21.2       12       -17       -17         853.3       17280       40.6       19       -9	M1-2	853.3	1												7	7-	23
853.3       7399       18.0       6       -6         1155.6       2728       40.7       9       -9         1155.6       7174       41.0       6       -6         83.3       11307       19.3       6       -6       -6         83.3       11304       19.7       10       11       -12       -12       -12       -12       -12       -13	=	1155.6	↓										 		3	-3	12
1155.6       5823       49.7       40.7       40.7       40.7       40.7       40.7       40.7       40.7       40.7       40.9	4-3	253.3	L		18.0						   				3	-6	, iž
853.3       9298       18.0       9       -9         1155.6       7174       41.0       6       -6         803.3       11307       19.3       15       -17         1155.6       9769       43.8       19.7       11       -17         1155.6       9769       43.8       11.2       -12       -12         1155.6       11180       46.6       19.7       19.7       19.7         1155.6       11180       46.6       19.7       19.7       19.7         1155.6       11180       46.6       19.7       19.7       19.7         1155.6       11736       47.5       19.7       19.7       19.7	<u>                                     </u>	1155.6	\$823		40.7										4	77	) %
1155.6   7174	7-1H	853.3	1		18.0										6	6-	
853.3       11307       19.3       15.       17       11       12       12       12       12       12       12       12       12       12       12       11       12		1155.6	7174		41.0										9	9-	
1155.6     8803     43.3     11     -11     -11       853.3     11879     19.7     17     -17       1155.6     9769     43.8     12     12     -12       835.3     14216     21.2     25     -25       1155.6     11180     46.6     19     -19       853.3     17280     23.1     37     -37       11:55.6     1774     45.5     30     -30	M1-5	8,3.3	4		19.3										15	-15	
853.3       11879       119.7       117       -17         1155.6       9769       43.8       112       12       -12         853.3       14216       21.2       25       -25       -25         1155.6       11180       46.6       19       -19       -19         853.3       17280       23.1       37       -37         1155.6       1774       45.5       30       -20	=	1155.6	L		43.3										11	-11	
1155.6     9769     43.8     112     -12       853.3     14216     .     21.2     25     -25       1155.6     11180     46.6     19     -19       853.3     17280     23.1     37     -37       11:55.6     13734     45.5     30     -30	M2-5	853.3			19.7										17	-17	/3
853.3 14216       .       21.2       25       -25         1153.6 11180       46.6       19       -19         853.3 17280       23.1       37       -37         11:55.6 13734       45.5       30       -30	-	1155.6	<b>↓</b>		43.8										12	-12	2
1155.6   11180   46.6   19   -19	M2-6	853.3		-	21.2										25	-25	
853.3 17280 23.1 37 -37 1155.6 11734 45.5 30 -33	-	1155.6	-		9.97								_		19	61-	
1155.6 11734 45.5	M2-7	853.3			23.1										37	-37	å
	-	1155.6			45.5										30	-35	2

Table A-19 (continued)

Also Current ovs-Wind Wuzzie Velucity I knot I knot I knot I meter/sec I nc Head Tail Dec Inc Inc I had Tail Dec Inc I had Tail Dec Inc I had Tail Dec Inc I had Tail Dec I nc	<del>-</del>			Basic Pro	Basic Project S. XY650E4	73					Dage 2	2	~		!	-	
1 mil	Sou		emputer Si	mulations							, c, c, c, c, c, c, c, c, c, c, c, c, c,	So Curren		d For s	she 11 :		
mil   Drift   Cross-wind   Wazzin 'Relocity'   Tange-wind   Mil   Cross-wind   Wazzin 'Relocity'   Tange-wind   Mil   Cross-wind   Wazzin 'Relocity'   Tange-wind   Mil   Cross-wind   Wazzin 'Relocity'   Tange-wind   Mil   Cross-wind   Wazzin 'Relocity'   Tange-wind   Mil   Cross-wind   Mil   Cro		Basıc		Elev. Corr.	Acumus Corr	1000											
The let is   The	Сћасуе	<del></del>	<b>├</b> ─-	ן שון	3	Cross-Wind I knot		Velocity ter/sec	L	-Wind	All Temps	rature	ALF De	nsity	Proj. #t.	of 11b	Prot.
1,6,0 1,	;	2 1 1 2	+-	meters	S E	21.5	ě	0.1	3	-							\$
25.4	H2-68	7,426	━~		6. %		ś		200	1	š	2	ر ا	190	Dec	Inc	reters 52
	ı	1155.6	<b>├</b> ~~		41.8		]										3
7.57	M2-7R	924.4		† ·	2.97												\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	:	1155.6	ļ		45.4												\ \ \ \
											1						
										<u> </u>	+						
																	$\setminus$
												-		-			$\setminus$
										<b></b>					-		
71. (A) OE GE														<del> </del> -			
(2) (2) (2) (2) (2) (2) (2) (2) (2) (2)										-							
26 - O													_				
71 07.(cw.) 02. (del						-								-	- 		
21 07.(- 4-1) 02. [GR]		7		-													
31 07/10 17/10							1										
	02-1001	37.0										···				-	

Table A-20 M110 self-propelled howitzer, 8-inch, firing XM753

	A 01589	Basic Projectibe: - 2007	133			ь 	Charge: 1 (11) 244 11/15)	482 (11)	B/5)	1				
Š	Source,Cumputer_Simulation	simulation				1	Also Curi	Also Currently Used for Shell:	d for 9	1,111				1
Basic	Elev. orr.	Azimuth Corrections	ections			Ö i va	Parque Porrections (meters)	ons (meter	7				Prob. Errors	rors
Elev.	1 7.1	Drift Corr. to Seft	Crose-Wind 1 knot	Muzzle Velocity	elocity r/sec	Pange-Fird 1 km :	Air forperature		Air Density Is		Proj. Wt	Proj. Wt. of 11h	Range	Set1.
m1 1.9	neters	8174	mils	Sec	lnc	Head 74.1	Dec.	) uc	يور	1nc	Sec	, uz	meters meters	meters
127.8		2.1												
355.6		6.1												
533.3		41.4												
11:2		16.1												
899.0		19.9												
853.3		22.3									۳.	~	3,6	
8.38.4		7.25												
974.4		0'.:												
9:7:6		30.8												ļ
1046.7		34.9												
1155.6		50.6									٠,	-2	26	
										_				ļ
_														
<u> </u>														
<u> </u>														
							_							

Table A-20 (continued)

Source.  Basic Elev. 1 m Meriers mils met 2518 11.19 4307 335.5 653 11.11	1 1	Computer Stanfattons											,
#10 #11.# #11.# #15.5 #11.1 #10.0	150		ilut fons		-	A 350 C	Also Gurrently Used for Shell:	Pd for She	  -  -				1
Elev. 11.,a 135.4 131.1 11.1	,	Asymuth Cotrestions	8001 22 4		P <sub>G</sub>	ge Correct	Series (meters)	181				Prob. Errors	rors
335.5 335.7 11.1 11.1	3 mr.)	Corr. to Left	Cross-Wind i Mnor	Muzzle Velocity 1 meter/sec	Pange-Wir Air Temperature 1 knot	ALT TE	1	Air Density		131. ¥t.	Prov. Wt. of 11h	Pange	E E
<del>                                     </del>	se ters		5.76	Dec Inc	Head Tit?	Dec	inc	Sec 1.	190	5 ec.	Inc	meters moters	an teri
		2.3											
		6.0											
<del>  -  </del>		19.3											
		5.5.											
		g											
5.41 313.3		22.4								-1	;	(56)	
6.55.7		2:12											
6131 924.4		25.5											
5928 977.8		36.5											
5.457 1065 7		34.5											
-803 :155.6		50.2								-	-3	(50)	
						ļ Ļ							
					-	-			 				
	 !										-		

Table A-20 (continued)

Basic   Elev. Torr.   Pancers   mils   motoris	Comput	To you from you are directly to													
Basic Elev. 177.8 155.5		combuter stantactions				ı	۲,	so Curr	Also Currently Used for Shell:	d for s	hell:				ı <b>i</b>
Elev. 177.8 155.5	-													  -	
Elev. 177.8 155.5	Corr.	Azimuth Corrections	ections				Sarige Co	priectio	Sange Corrections (meters)	15	Ì			Prob. Errors	rrors
177.8 355.6		Drift Corr. to Left!	Gross-Wind 1 knot	Muzzie Velocity i heter/sec	elocity r/sec	Range-Wind 1 knot		Air Temperature IN	rature	Alf Density	15159	Proj. Wt	Proj. Wt. oi 11b	Range Defl.	조 :
-	ers	711.5	#1,15	260	Inc	Pead Tail	-	Sec	Inc	بۆ	ي	Sec	Inc	meters meters	reter
		2.3					L								
		ال 1.9					-								
5301 533.3		10.1					 	_							
558: 711.1		15.6											ļ 		
7643 800.0		19.3					_ ·								
577 853.3		22.0	<b>+</b>			_	<u> </u>					æ	ę.	32	
7500 883.9		02					   				-				
7382 924.4		24.2				-									
8.5.6 141:		30.;					   								
6578 1064.7		33.2									i				
580; 1155.6		8.9*				-	-					-1	7.	ä	
							_						 		
_															

Table A-20 (continued)

Part   Part		!						ļ						
Miss Care   Miss			gC .	Ì	\$ . W.		1		1, 345 m/s)					
Part   Part		Sot	- 1	uter Staulattons			į	Also Carren	To flour 6	] :				1
Print   Corr. 100   Print   Correction   Print   Pri		14910	Elev. Corr.						JOE DASS AT	Selli				J
Verificate   Cross-Month Wagging   Verificate   Verific	Reno				10000		uPa	de Corrections	inetors,				P. P.	1
15.7 15.7			12.7		Cross-Wand 1 knot				1 1		Proj. Wt	of Th	B and	
15.7 15.7	Meters	. 1	4		-1:5	10		~		_		l	,	;
10.1 10.1 10.2	2.63	8		3.6		+-		S.	رون	ν.	ŭ	Inc.	Meters	meters
19.7 19.7 19.1 19.1 19.1 19.2 19.2 19.2 19.2 19.2	£.	155.6		-				+		1		1		
25.2 25.3 25.3 25.3 25.3 25.3 26.4 26.4 26.4 26.4 26.4 26.4 26.4 26.4	8:20	53.3		17.1			+-	+		1				
	937.6	7:1:1		15.7	-	\ \ \		+	1	+				
25.3 25.3 25.3 35.4 36.3 36.3 36.3 36.3 36.3 36.3 36.3 36	9.19	200.0		2		-		1	1	1				
25.7 25.7 19.2	00-6	853.3		1 22		-	-	1	1	+	1			
39.4	Out 5	77 20			-	-	-	1	+	+	0	٩	1.8	
39.7	-1.70	7.7 6	<del> </del>	13.3	+-			-	1	1				
	ر. ۵۹	26	-	f1	+	-		1	1					
3 5	7.67.8	1055.	<del> </del>	,,,	+-			1		+				
	.23:	1:55.4		.0.3	+-	1-			-	+	+			
RTA-1 (37) 2/08 Tag 75								-	+	$\dashv$	1	4	1.9	
RIX - 1 (37) 2/68 Tac 7;	-			-	<del> </del>				+	$\dashv$	1		_	
RTA - H : 31) 2768 No. 75		-	<del> </del>	-		+	1	1	-					
RTA - 1 (37) 2/05 (Ac 7)		-	<del></del>		-	1							-	T-
RIX = A : 31) 2768 Sec 75	1-	1	-	+	+		1				-		-	
27 384 Bbs 75 (10, 11-181)	-	1-	+-	-	+		1			_	-	-	-	7
	RFX-24	ाजा ट्रोब	0 Dec 75	7	1					<u>_</u> _	-	-	-	T

Table A-20 (continued)

Source Elev. s mile 177.8	-1.111	Computer Staulations												
Elev. 5 mile 177.8 335.5	V. Corr.					ı	Also Cur	Also Currently Used for Shell:	ed for	She 11:			ĺ	1
Elev. s mils 177.8	-	Azimuth Corrections	ec:10us			abu <b>r</b> s	Sange Corrections (meters)	ons (mete	79)				Prob. Errors	rrors
s mile 177.8 335.6	1 711	Drift Corc. to Left	Cross-Wind J kno:	*uzzle velocity l neter/sec		Pange-Wint Liknot	Air Temperature	1	Air Density	nsıty	Pro). Wt	Proj. Wt. of 11b	Range	Def1.
	neters		Bils	υ <sub>λ</sub> Υ	ju:	Head Tell	i ac	282	Sec	Jnc	ğ	:nc	meters meters	meters
		3.4												
-		υ'n												
15319 553.3		1;.3												
11515 711.1		17.2												
11457 800.0		21.1												
11590 853.3		23.8									.:	-15	61	
11481 888.9		<b>9</b> .55												
11320 924.4		5.42												
812-6 18601		12. 3												
10150 1054.7		41.0												
9005 1155.6		53.5									1.2	ij	2;	

Table A-20 (continued)

		Bas1c P	Basic Projectile:	XX(75.1			1	Ę	, j	Charge: 5 (42, 442 m/s)	42 m/s)					
	Sou	Source:	Computer Staula lons	Sur		İ	1	•	ilso Gur	Also Currently Used for Shell:	i j pa	S-e11:				1
	Basic	Elev. Corr.	Azimuth Corrections	rections				Fange	orrecti	Sange Corrections (meters)	[53]				Prob.	Prob. Errors
Range	Elev	[ זיי [	Orift Corr. to Left	Cross-Wind 1 Knot	Muzzle Velocity	$\vdash$	Pange-Wind		ur Temp	Air Temperature	Air Density	rs1 ty	Prol. W	Prol. Wt. of 115		2
Meters	m:18	Sharec	Fils	SI1E	3,	inc	Head Teal	7-	ž	ju:	ų Ž	Inc	Sec	Inc	Meters	meters meters
5284	177.9		3.5				ļ —	<del> </del>								
8692	355 6		7.7					İ								
1 10 79	533.3		, 1:		-				T I							
12359	7.11.1		#: ()			T										
12518	800.0		27.5													
1.24.54	853.3		24.6				<del> </del>	-					2	٦	<u>'</u>	
12340	988.9		25.7			 	-	-								
12:21	924.4		29.1													
11813	977.8		33.2				<u> </u>									
:0941	1066.7		42.0				-									
9.03	1155.6		\$4.8										27,	71-		
						_		_				-				
	-															
SAPPAGE	(31) 28	SAPPLIER (3T) 2700 Dec 75				1	1		1			1	]		1	7

4) 4)

Table A-20 (continued)

Trections  Trections			Basic P	Basic Projectule:	128753			ł	C	rge: 6	Charge: 6 (M2, 512 m/s)	(5,6					
13   13   14   14   15   15   15   15   15   15		Sour		omputer Simulat:	ons					Also Curi	rently Use	d for	Shells				· 1
Continuity Corrections   Continuity Continuity Continuity Corrections   Continuity Co																	
Drift to Left	B4.9	2110	Elev. Corr.	Asimuth Cor	ections				abur <sub>b</sub>	Correction	ons (mete)	S.			1	Prob. 1	rrors
4.1         Dec         free         Tine         Dec         Tine         Dec         Tine         Dec         Tine         Dec         Tine<		Flev.	11 = 1	Drift Corr. to Left	Gross-Wind 1 knot	Muzzle V l mete	elocity r/sec	Pange-		Air Temp	erature	Air Se I	"sıty	Proj. Wt	t. of 11b		Def1.
8.6 13.1 19.4 19.4 25.2 25.4 28.5 35.6 14.5 14.5 14.5 14.5 15.0 27 29 29 29 29 20 20 20 20 20 20 20 20 20 20 20 20 20	Meters	mıls	meters	mils	a:1s	Dec	Inc	Head	1.6	500	, nc	ĕ	Inc	Dec	Inc	meters	meters
8.6         13.1         19.4         23.5         23.5         25.4         28.6         31.1         35.6         36.0	5627	177.8		4.1													
19.4 23.5 25.4 28.5 31.1 35.6 36.0 28.6 31.1 35.6 36.0 37.0 27.0	10455	355.6		8.6												_	
19.4         23.5         25.2         28.5         31.1         35.4         44.5         56.0         21         21         21         22         23         24         25         26         21         21         21         22         23         24         25         27         21         22         23         24         25         27         28         29         21         21         22         23         24         25         26         27         28         29         21         21         22         23         24         25         26         27         28         29         21         22         2	13099	533.3		13.1										1			
23.5 28.5 28.5 31.1 35.2 36.0 56.0 56.0 5727 56.0 58.0	14564	711.1		19.4													
25.3 28.5 31.1 35.0 56.0 56.0 56.0 57. — 27. — 27. — 21. —	147.74	800.0		23.5													
28-5 35-5 34-5 55.0 5.0 5.0 7.1 7.1 7.1 7.1 7.1 7.1 7.1 7.1 7.1 7.1	14712	853.3		25.4										7.2	-27	22	
35.5       44.5       23       -23         56.0       23       -23         66.0       21       -23         7       10       10       10         8       10       10       10       10         8       10       10       10       10       10         9       10 </td <td>14590</td> <td>6.888</td> <td></td> <td>28.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	14590	6.888		28.5													
35.2 34.5 56.0 21 -21	14403	924.4		31.1													
\$6.0 \$6.0	14000	9:7:6		35.4			,		 								
56.0		1046.7		44.5													
	11542	1155.6		56.0										2.1	-23	1.1	
	-																
				-					•								

Table A-20 (continued)

		Basic	Basic Projectile:	X4753				1 6		7 (42 60: 5/6)	10,0					
	Sou	Source	Computer Simulations	lons			¦	,	Aiso Curr	Also Currently Used tor Shell:	d tor S	e12:				1 1
												-				
e	Denic	Elev. Corr.	Azumuth Corrections	rections				Ange	Correction	Range Corrections (meters)	(6.				Prob. Errors	rrors
Range	Elev.	l mal	Drift Corr. to Left	Cross-Wind I knot	Muzzle Velocity I meter/sec	locaty /sec	Range -	Pinds of	Range-Mind Air Temperature	rature	Air Density is		Proj. Wt	Proj. Wt. of 11b	Range	₽£I.
Me ters	8718	meters	mils	mils	oac	Inc	Head	1.411	Sec.	Inc	200	i.	200	Inc	meters	meters meters
8443	177.8		4.6													
12702	355.6		9.6													
15772	533.3		14.8													
17460	711.1		21.1									1				
17744	800.0		25.4					-								
17707	853.3		28.5										0,	07-	25	
17583	888.9		21.3		-		<del>-</del>	_			-					
17379	924.4		33.4					†— !								
16927	977.6		37.9					-				<u> </u>				
15759	1066.7		47.3								-	-				
14015	1155.6		61.7				_					_	3.1	16-	02	
							_					_				
		1												-		
					-							-				
										_					-	
SARON - F	/2 (10) )	SARPA-FR (UT) 2/BG Dac 75						1								

Table A-21 M1:0E2 self-propelled howitzer, 8-inch, firing XM711

		Prob Error		10.0				1	1										1		\   
			. of 11b	Inc	7	7	4-	F7	9-	7-	6	٩	-15	-12	- 19	=	-27	-21	-40	16-	
	Shell:		Proj. Wt.	Dec		2	-	51	٥	7	6	4.	=	12	19	14	2.7	21	0,7	3:	
	Por Por		Density 10	Inc															_	<del> </del> - 	Ī
4	tly Use	ers)	Atr De	Dec.													ļ :				
1 of	Also Currently Used For Shell:	ions (met	erature 1	Inc																	
Page 1	Als	Range Corrections (meters)	Air Temperature	Sec.											-	-			-		
	,	-gange	Pance-Wind 1 knot	Tail														-			_
				Head																	
			Muzzle Velocity l meter/sec	Inc																	
			Muzzle l net	ပိုမ်င်																	_
		Corrections	Cross-Find 1 knot	mı.s																	_
Basic Projectile: X711		Azınuth Corr	Carr. to left	T.E	25.9	59.0	25.3	57.5	24.9	57.0	24.6	56.8	26.6	60.1	27.4	61.5	29.5	55.4	30.2	70.2	
Basic Pro-		Elev. Corr.	lie i	meters																	
Boute			Range	meters	5316	1046	6737	1808	7593	5808	9394	7250	1:559	9006	12:17	9703	14458	11521	17661	13961	
		Basic	Elev.	2,15	853.3	1155.5	853.3	1155.6	853.3	1155.6	857.3	1155.9	833.3	1155.6	953.3	1135.1	853.3	1135.6	853.3	1155.6	
i d	inos		Charge	† <del>- †</del>   :		:	7  1:	=	31-3	-	7-1E	· .			#2-5		43-6 6	-	, -Z %	-	

Table A-22 M110E2 self-propelled howitzer, 8-inch, firing XM650E4

			Pasic Pro	Pasic Projectile: Nov550E:				İ		Page 1	-  -	-				
j.vurge	Ö	Course: Computer Staulati	aulat tons							4	Also Currently Used For Shell:	ntly Us	ed For	she 11:		
'	1810		Elev. corc.	Azımuth Cor	Corrections				96u <b>e</b> c.	. Correct	'Ange Corrections (meters)	ters)				Prob. Erro:
Charge	100	17.2.17.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.	î ê	Orift Cirr. to Left	Cross-Wind 1 knot	Hurzle i met	Murzle Volocity i meter/sec	Range-Wind 1 knct	-Wind not	Air Tem	Air Temperature	A1r C	Air Density	Proj. Wt.	o i	1 1b Range Def1.
-   -   :	<u>1</u> <u>1</u> <u>2</u>	Meters	meters	31 LE	m115	ğ	Inc	Head	7,811	Dec	Inc	ě	Inc	Dec	Inc	meters
2 -1 S	7	\$309													-3	/%
<del></del>	1.55.6	9707												7	-2	7 %
	853.3	6290		22.9										4	7-	29
<del>  -</del> -	1155.6	3083		51.3						   	<u> </u> 				-3	29
5:	853.3	7575		22.5								_		و	9-	32
1	1135.6	5803		\$0.8										7	7-	32
7- [K	853.3	9388		22.6										6	6-	81
1	1155.6	7234		51.2										Q.	9	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
S-17:	853.3	11576		24.3										1.5	-15	2
<del>  -</del>	1155.6	7006		5.5.7									_	12	-12	<u>-</u>
H2-5	853.3	12437		25.0										01	-19	<u>~</u>
-	1155.6	9703		55.7										14	-14	
H2-6	853.3	79071		26.8										27	-27	2/
-	1155.6	17511		53.8										21	-21	
32-7	853.3 17964	17964		29.0										ç,	07-	~ / /
-	1155.6	14009		62.5										15	5	\$\\\
-				· !										_		/

Table A-23 M110E2 self-propelled howitzer, 8-inch, firing XM753

		7	Basic Projectile: Computer Simulations	) <u>247</u> 53			€	Arge: 1	Charge: 1 (Mls. 247 m/s). Also Currently Used fornell:	a/s)	ne111:				
	Sou	Source:					Pange	Correcti	Range (orrections (meters)	ls)				Prob. Errors	rrors
ď	Basic	Elev. Corr.	Azimuth Corrections	rections						A. 7. 8.	181 tv	Proj. Wt.	of 11b	Range	Peri.
Range	Elev.	1 1753 1	Drift Corr. to Left	Cross-Wind 1 knot	muzzle Velocity l meter/sec	_	Range-Wind I knot	NI TEN	Alg Temperature	7.		· [	The		meters meters
Meters	B118	meters	ella	mils	ů	Irc	Head Tail	ğ	Inc	e l	2	3			
2347	17.8		1.7				1	-							
3682	355.6		4.8						1						
7042	533.3		8.3					-		<u> </u> _					
54.18	711.1		12.9					1	-	_				_	
7875	800.0		15.9					1	-	_			-	<u> </u> '-	
5443	853.3		18.1				-	1	1	_		,			1
5374	888.9		19.7					_	-	-					_
5296	924.4	7	21.5				-	_ {	-	_	1				_
5121	977.8	80	24.7					+	-	+	_		-		
4015	1066.7	7	31.0				1	$\frac{1}{1}$	+	+-		~	7	=	-
4165	1155.6	9	40.2				+	1	+	+-	_		_		-
							+	$\downarrow$	-	$\downarrow$	1		\ <del> </del>	_	_
								-	-	_	_			<u> </u>	-
	-				<del> </del>		+	+	+	+	-	$\downarrow$	-	<u> </u>	_
	-						+	$\perp$	+	-	$\downarrow$	_	-	<del> </del>	_
	-						+	$\perp$	+	+	+		+	-	-
	-	 					<u> </u>	_	-	$\frac{1}{2}$	1	1	-	-	
	-														

Table A-23 (continued)

Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Source,   Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Computer Simulations   Control of Control			Basic P	Basic Projectile: X4753	1753			1	S.C.	rde:	Charge: 3 (Ml. 270 m/s)	(5/4					1
Period   P		Sou		oute: Simulation				ļ		Also Curi	rently Usa	ed for	Shell:				ı
DOTIC   CLOSS-Wind   Wange-Wind   All Temperature   All Dots   A	1 4	\$10	Elev. Corr.	Aziauth Cor	rections				b 184	Correctio	ons (meter	ıs.				Prob.	Errors
13.7 Sec. 10c Nead Yall Over 10c Inc Nead Inc Nead Yall Over 10c Inc Nead Inc Nead Yall Over 10c Inc Nead Inc N	Rar re	Elev.	1 43 1	Drift Corr. to Left	Cross-Wind 1 knot	Muzzle \	er/sec	-ande-	-181 m <sup>2</sup>	Alt Temp	erat 1"e	ALE De	insity	Proj. Wt	t. of 116		Defil.
1.8 2.1 15.7 17.0 18	Meters	M118	seters	11.15		Dec	lnc	Head	1.81	ĕ	Inc	Sec	Inc	υ <b>ψ</b> ζ	Inc	meters	meter
13.7 17.0 17.0 18.0 19.0 20.0 20.0 20.0 20.0 20.0	2804	127.9		ac .													
20.7 19.7 19.5 20.4 20.0 20.0 20.0	4 174	355.6		8.4													
19.7 19.3 20.3	5590	533.3		 2			 					<u> </u>					
15.7 19.5 20.3 20.9 20.9	9.50	7.T		:													
25.3 25.3 26.3 26.3 26.3 26.3 26.3	6113	801).0		15.7						     							
20.7 20.0 20.0 20.0	53:0	853.3		6.1										-7	7	(22)	
30.9	9274	188.9		14.5													
24.4	107	424.4															
20.7	5990	9.7.8		7.97													
70.0	5522	1065.		80.9													
	8:87	1155.5		6.02					   						- 3	(22)	

Table A-23 (continued)

		Basto P	Basic Protectile:	134753			ļ	<b>9</b>	Clarge: 3 (ML, 299 m/s)	(41, 299	(8/1					1
	Sou	Source: Compu	Computer Staulations				1	·	Also Curi	Also Currently Used for Shell:	.o. pa					
*		Flev. Corr.	Azimuth Corrections	rections				46:184	Coure-tio	Pange Corrections (meters)	rs)				Prob. Errors	rrors
Range	Elev.	1 31 1	Drift	Tross-Wind	Muzzle Velocity		Range-Wind I knot	Wind of	Air Temp	Air Temperature Air Density	ALT De	nsaty	Proj. W	Proj. Wt. of 11h	Range Defl.	vef1.
		Seters		1 knot		+	Head Tail	1411	Dec.	150	Sec	Inc	) Sec	Inc	neters	meters meters
3106		1	1.8													
5238	355.6		4.7													
76.9	5,1.1		8.0													
7581	711.		12.5													
1543	800.9		15.3												-	
1503	853.3		17.5								_		•		,	
067	888.9		19.2								_					
ŝ	97.76	-3	21.0								_					 _
671.	977.8	80	24.1						 							
6,5,80	1065.7		30.6							_						
582	1 2		39.8				_						4	7	26	_
	_						_			 						
	_										_	_	 			_
							_	<u> </u>	_	_	_					
$\perp$		  -					_		-	_	_	_			-	
	<del> </del>	+-					_		_	 	-	_	 			
	_	+	<u> </u>							_						_
7	  -   -	7 - 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1														

Table A-23 (continued)

Paris   Paris   Cappiter playint   1   1   1   1   1   1   1   1   1			Basic Py	Basic Project, le:	22753		΄.	hurge .	Thurge 4 (41) 341 =/9)	(5/2)					
Electron   Corrections   Parage Corrections   Par		Jan 13		puter staulat.	St.		1	Also Cur	rrently Us	ed for 3	hell: _				1
Elev.   1 cal   Dr. ft.   Court to Led   Land   L			Flow, Copr.	Azımuth Corr	*ec*10ns		bu <b>e</b> a	e Correct	lons 'mete	rs)				Prob. E	rrois
11.1   12.5   12.0	Range	Elev.	1 511		Orces-Wind		Range-Wind Lange	ALE TER	perature	Air Den		Proj. W.	दी। ३०		2ef1.
135.4   2.0	\$ 1 m	_	meters		1 Kno.		Head Tail	ě	Inc	ž	- Luc	Sec.	Inc	meters	ne ter
155.4	37.16	<u> </u>	1	2.0											
11.1	64.26	355.4		4.7					_						
11.1   12.5	.553	533.3		3.1					 						ĺ
800.0 15.5 9 8.1.8 17.6 9 924.4 11.0 9 977.8 24.1 9 1155.6 10.1 5	1284	11.		12.5							1				
13.0   15.0   9   9   9   9   9   9   9   9   9	9372	800.0		15.5											
924.4 19.2   19.	9716	853.		9.7.					_			6	61		
924.4 31.6 24.1 11.6 24.1 11.6 24.1 11.5 24.1	4504	986		19.2											
1155.d 1066.1 10	9071	7.776		21.6											
1155-d 10.7	8783	9.77.	-	24.1											
1155.6	8:03	1066.		30.7					_						
	71.75	1.55		.0.							I	2	3		
		_													
								ļ 							
		 					<u> </u>								
		  -						-	 						

Table A-23 (continued)

Ş

		Bass. P	Basi: Projectile:	XM25.3				Chai	: 46	Charge: 5 (M1, 405 m/s)	<u>رد)، هـ دُه</u>					1
	ros	Source	Computer Simulations	1005			1	••	Also Curi	Also Currently Used for Shell:	ed for S	shell:				ı
Pario		Elev. Corv.	Azimuth Co.rections	rections		1		e(1,1)	Loriectic	Fauge Corrections (meters)	rs)				Prob. Errors	Errors
Ran se	Elev.	1	Drift Corr. to Left	Cross-Wind 1 knot	wuzzle :	Wuzzle Velocity I meter/sec	Pange W.n.t.		Air Temperature		Air Density	rsx†y	Prc). W	Proj. Wt. of 135	Range	Seft.
Meters	STIE	ae ars	3.18	517.2	Sec	Inc	Lead [1.1]	::	Dec	100	)ac	nuc 1	Dec	,nc	meters	meters meters
<b></b>	177.8		2.6		_											
7.78.	355.6		5.5													
5 64001	533.3		۶.۶													
11242	711.1		13.5													
11.592 8	300.0		19.7												_	
11317 8	851.3		6.91										13	5:		
11210	7.884		20.5													
11053	2.4.5		22.4											_		
0772	8.776		25.6													
01 (766	1046.7		32.4													
3990 11	1155.4		75.7										ä	7		
																_
-											_				į	
-																
-																_
-						_	 				_				_	_

Table A -23 (continued)

		Basic F	Basic Projectile:	XM753				Ch <sub>2</sub>	Charge: 5	5 (M2, 424 m/8)	n/s)					1
- 444	Sour	Source: Comp	Computer Simulations				!	•	Also Curr	Also Currently Used for Shell:	for the	Shell:				,
	Basic	Elev. Corr.	Azimuth Corrections	ections.				Range (	Correctio	Range Corrections (meters)	(8)				Prob. Errors	rrors
Rande	Elev.	l m l	Drift Corr. to Left	Cross Hind i knot	Muzzle Velocity 1 meter/sec	elocity r/sec	Pange-Wind I knot	181.00 0.00	Air Temperature	erature	Air Density	nsity	Proj. Wt	Proj. Wt. of 11b	Range Defil.	Def).
Meters	mile	meters	mils	Fils	Dec	Inc	Head Tail	7811	Sec	Inc	ပီခိုင်	Inc	ပ <del>ို</del> င်	Inc	meters meters	meters
75 67	37.8		2.8					-								
8250	355.6		5?													
0.501	533.3		9.2					-								
11802	111.1		13.9													
959L1	800.0		17.0					İ								
68811	853.3		19.3					1					-:1	-1.7	29	
18211	882.9		21.6													
11518	925.4		22.8													
1,275	3.776		26.1					_								
10438	1066.7		33.1													ļ
9272	1155.6		43.1										13	7:-	22	
					<u> </u>											
																İ
		188 TO 18			Ì									ĺ		

Table A-23 (continued)

O

		Basic P	Basic Projectile:	284753			ļ	Charg	j .	Charge: 6 (82, 497 a/s)	(s/e /					ı
	Sow	Source; Com	Computer Simulations	ns			l	.A	lso Curre	Also Currently Used for Shell:	d for 5					ı
Han Han	Basic	Elev. Corr.	Azim.th Corrections	rections				Pange Co	priection	Pange Corrections (reters)	<u>ē</u>				Prob. Errors	rrors
Range	Elev.	1 111	Drift Corr. to Welt	Cross-Wind : knot	ı	Muz.le Velocit, l meter/sec	Pange-Wind 1 kmot		Air Temperature		Air Density	nsıty	P-03. Wt.	दां। ३० .	Range Defl.	De f1.
Meters	S (TE	meters	117	#1.1E	عدد	Inc	Head  T111	┢	i i	110	ů Č	i ac	ě	Inc	meters	ne ters
9759	177.8		3.2					_								
10053	355.6		6.7				_	-								
12649	533.3		10.3				_	 					i			
14985	711.1		15.2													
14289	800.0		18.5													
14:29	853.3		20.8										2.5	-25		
14:12	6.888		22.6													
1,39,1	9.4.4		24.5													
١,٠٠٢	8.7.6		6.55													
12565	1056.7		35.2													
11125	9.8611		45.7										19	-19		
-									_			-				
															_	

Water Sales with the sales of the sales

Table A-23 (continued)

Se Basic	•				1	Cranton in	18/11 01/ 471	18/1					
1 3	Source	Computer Simulations	tions			klso Cur	Also Currently Used for Shell:	d for She	ii.				1
1	Elev. Corr.	Azimuth Corrections	\$00,1008		Pan	Range Corrections (meters)	ions (meter	(a.				Prob. Errors	FIOTS
	┼	Drift Corr. to Left	Cross-Wand	Muzzle Velocity I meter/sec	Range-Wind 1 krot		Air Temperature	Air Dersity		Prol. Wt. of 11b	of 115	Range Defl.	3
meters mils	ts mecers		#118	7.c	-∤	å å	Inc	Dec I	1.10	Dec	Inc	meters meters	meters
8179 177	177.8	3.6											
12:69 15:	355.s	, ,											
15143 533	533.3	:11:			 							(97)	(2)
17950 711	711.1	2.4.		 		·						(31)	(3)
1733   800	800.0	2.02							   			(55)	(3)
58 867.1	453.3	22.7								3.	-3:	57	(5)
568 2.1.1	2.15.8	÷										(51,	(7)
770 16691	, , , 5 6											(3.6)	(7)
16537   97.	4.77.6	0.08										(53)	3
15349 1565.	٠. ن	37.5							-			(89)	(4)
1304 14050	6.5	a;								37	-36	23	(3)
					-								
 							i 						

Table A-23 (continued)

	716.00	Basic Projectule:	15753		)	(harge: 684 (M2, 497 m/s)	6Re (32.	J 87 784					ı
•	Source: Com	Computer Staulacton			ļ	Also Cur	Also Currently Used for Shell:	ed for Sh	- I				i I
51883	Elev. Corr.	Azımuth Corrections	ections		husa	Singe Corrections (moters)	ons (meter	18.				Prob. Errors	1,012
Range Blev.	1 1 1 1	Drift Corr. to Left	Cross-Wind 1 kno*	Muzzle Velocity i meter/sec	Hunce-Win.!	-	Air Temperature	Air Density	<u> </u>	Proj. Wt. of 11b	of 11b		Jef1.
Moters mils	s peters	2118	71.15	Sec Inc	Head Ta:1	3	35.0	: : : : : : : : : : : : : : : : : : :	Inc	ŏ	Inc	meters meters	neter
6.1.1	<u></u>	3.5							-				
1203.   355.5	t	¥:							-				
15574 532.3	~	4		_	-				-				
1.11.7 99.7	1	15.6							+-	-			
13024 800.0	0	14.3							-				
18136 853.3	3	20.3								+-		52	
91181	5	21.8		 					_				
18013 924	4	3.6											
17697 4.7.9	a	. p 3							-	-			
1:38- 1066.	,	32.3							-				
15090 1151.6	4	· · · · ·			<u> </u>				+-			2,1	
									-				
									-				
- <u>-</u>			-					_	_	_			

Table A-23 (continued)

Source: Computer Stau atlons Basic Elev. Corr. Azimuth Correc Elev. 1 mil Corr. to left Corr. 1 mil Corr. to left Corr. 1 mil Corr. to left Corr. 1 mils Corr. 1			C1888	Basic Protection	29(3)											
Also Currently Used for Shell:  Drift Cross-Mind Muzz'e valoutly Sand-Wind Air Temperature Air Density Proj. Wt. of ill Corr. to left I knot Inceres:  Corr. to left I knot Incervised I store Inceres:  Also Currently Used for Shell:  Corr. to left I knot Incervised I store Inceres:  Also Currently Used for Shell:  Corr. to left I knot Incervised I store Inceres:  Also Currently Used for Shell:  Also Corr. to left I knot Incervised I store Inceres:  Also Currently Used for Shell:  Also Corr. to left Inceres:  Also Currently Used for Shell		Ş		aputer Stau atte				!	G Large	E) V9/	2, 588 (	(8)				1
Drift Corrections and Sange Corrections (reters)  Drift Corr to left I knot I Investigate Air Des I Inc Dec I Inc De		Ď,						1	Alsc	o Currently	Used :	or Shell:			İ	ŀ
Delife Gross-wind Wurst's whose wind Air Temperature Air Density Proj. vt. of the mile mile Dec Inc Head Tail Ges inc Dec Inc Inc	ď	asic	Elev. Corr.		rections.			TP <sub>Q</sub>	19° Cori	rections (m	eters,				40.6	
115 Pec Not 150 Pec 15	Range		1 #1	Drift Corr. to left		Muzz'e Ve]	louity	Range Wind	d Atr	Temperatur	A A L	Density	-	1. of 1.1b		2671
	Meters	<b> </b>	Seters	s ? ; č		-	$\top$	Head			-		_			
	9208	g'1				┤─	1-		+-	+	+	<del></del>	Ř	Inc	meters	S 2 a
	1-812	355.6				-		-	<del> </del> -		-	+				
	18396	533.3					-		+	-	-					
	20003	11.1						-	-	-	-	-				
	21295	830.0				-	-	<u> </u> 	-	-	+	-				
	21-21	853.3				-	<del> </del> -		+	-		+			:	
	-0812	988.9			<del></del>		1-	-	+		+-	-			76	
	2:283	,26				<del> </del>	-	-	+	+		1				
	20932	97.76				-	+	+	+	-						
	96.61	1056.				<del> </del> -	-	+		-	-	_				
	179.29	1155.6				-	+	+	$\downarrow$	-	+	1				
						-		-	-		1				∵ ∷	
	]_				-		+		_	_	-	_				
						-		-	_						-	
			1													
		+									-				+-	
	1		_						_	_	_			<del>  -</del>	-	]
					-				_						+-	Ī

### APPENDIX B SPIN73 PREDICTED AERODYNAMIC COEFFICIENTS

Table B-1 4.2-inch M329A1 without extension

													!	
	TCTAL LFVGTH 4×E00		NOSE LFNGTH JARSO	ECAT TAIL LENCTH	! :	CG (F) NOSE) -2.980	94 010	NEDLA" Olameter	BANC CIANETER 1+024	Ε. Β.	NCSE RADILS 2.500		BOOM LENGTH	-
	_ :-: 6:9	1x Le-1N-Sc 65.500	1 P - 1 - 0 - 2 - 0 -	7Y LP-1N-SC 740.000	#E1GHT LBS 25,400	•	SI,  TH 1° 1 CAL / TURN 20+000	4CTUAL 1%1S7 CAL/1C4h 26.000	7#157 1046 1000	GUN-ECEF INCHES 4-19:	# 4 0 R	16. <i>peop</i> lae 066-f 59.000	AIN DENSITY SLUGS/FT+#3	5177 1**3 36 :
	! ! !	!	₩	PODYNAM 10	AEFOCHAMIC COFFICIENTS GATE COFFICIENTS BASED ON BATE	ATS (PATE	COEFF 1C 10	ENTS BASE	E ON GATE	((\5/0)				
		Š		9	CPA	CrPs	CAFA		ChPAS	CPFill	(5136)	CNPALS	C#O	֓֞֞֞֜֞֜֞֞֓֓֓֓֓֓֓֓֓֓֓֓֓֟֓֓֓֓֓֟֓֓֓֓֓֟֓֓֓֟֓
- 1	197	3.112	ı	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	 	1,7r8		C 10 4	-897.000 -897.000	2.078 2.078	3.17E	.152	-5.046	6.03.
•	.200	3.6.80	!	4.36	F. F. C. I	768	30°-1	84.517	-811-667	2.576	3.278	,	9.0.9-	0.0
•	, c 3 ,	4		7	, in	401.1	.000	45.600	000.55%-	5.578	3,378		-1.938	2000
•	5 d 4 d	5.415			7-0-7	-1.008	-09E			3.678	3.576		-16.569	0.1
	.c.le	0.036 473.7	4,10,0	1 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	4000	77.	• 14C	000000000000000000000000000000000000000	-161.009	3.1/8	3,378	 	-16.818	
•	414.	7.334			1.376	7¢B	-213			33 U1 (U	3,376	1	-20.652	020
•	, a	6.715		4 0 0 4	1321	847	455.	7,117	-43.667	ייטי מע איניי איניי	3.378		-22.078	0 0 0
•	9.55	444			1.354	7t8	447.	÷.410	-24.600	950	3.37E		-23.411	020
•	Sug.	7 (7. 7			1.344	768	1. 1. 1. 1.	1.557	-18.067	3.106	3.37P		-23.411	5 [ 0
•	433	3,759		!	1.374	842	\$52°	4.703	615.6-	3.316	3,376		-23.411	- 18
•		2,23			a :	147.1	ر د د	3.450	-1.000	3.128	3.37E		-23.411	4 TU
•	2 7 7	21/07		000	2.7.	10 10 10 10 10 10 10 10 10 10 10 10 10 1	(4)	2,650	-1.000	10 m	3.5		-23.411	7
-					L77.		/67*	000		20147	3.7.0		11.62	

Table B-2

4, 2-inch 4/329A.1 with extension

	1016L   Fr01F 4.710	7.5	1,996 1,996	FC41 1616 LEAGIF - 0.500		CG (FM MOLE)	- 1	DIAMETER 13)	9.85.0 1.0 1.0 1.0	o 3	105E 4.20105	1.	300% LENGTH 1.600	
			<u>!</u>		145174	: 3	15:41	ACTUAL 18.1ST	12141	3985-408	3431	ENPERATURE	AIR DENSILY	THE STREET
191.42 1.00 1.00 1.01	1	- IN-SG	006+EH8	 90	1.20.23C	Cet	0.150	CAL/7144	Z0+620	4.151		DE G-F 59.000	\$L065/F1**3	38
			DF+0	POCTRAPTC C	CEFF 1CTE	CCEFFICIENTS (MATH COEFFICIENTS HASEC	i oi e e i o i	ENTS HASE		ON GATE * (PZZV)				
1 3		13	943	( kg	á	Ctub	4345	C#143	CAPAS		(5)363	CNPA(5)	0 H C	d 17
6.0	E 8 .	2.Hes	- 080.5	357.45	1.170	+51.	369	91.690	91.690879.400	£3044		139	24.04.7	
. 100		2.865	550.5	3.816		70.	い か し し	) · · · · · · · · · · · · · · · · · · ·	10 - A - 6 - 7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		2,263	. if	1 4 6 6 1 1	
04+3-	4	34.6		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		: 57) 57) 5	, F. 60 . 1	1 4	1,00,000	i	2,313		-7.834	3
005.	010.	91 4 91 4	2,1.5	0.10	1.127	040	016	05,77	-439,800	j	3,55		21.22.12	4.
	136	5.007	2.236	4,165	1.115	010-1	. 984	32.53	.288.033		0.00 to		6 10 11	•
- C	4	496	, pe,	3.85	17.00	.458.		15.670	15,470 -157,250-	Ì	3.563		- inabbb	3
1.00	.466	5.157	2.315	246*0	1.275	10 TO	.194	13,413	77 C C C C C C C C C C C C C C C C C C		יים קיים קיים קיים		19.333	
1 5500	1		<del> 3</del> 3	100	4	100	5 G G G G G G G G G G G G G G G G G G G	4 6	-42.067	2.563	3.363		-20-754	:
35.	054.	9 C	7 7 7 9 0 9 0 9 0	41.0		75.	25.5	7 1 9	13.651	3.273	3-363	- 1	-22 07E	פע
, i	10.4	310	2.7.3	4.156	25.5	456	.236	6.282	-25.320	3.283	3,363	.293	-22.078	
200	77	7	2.85	4166	1-521	7E to	11.2	5442	-16.947-	3.293	3-163	1	-22401B	1
7.5.6	125	 	50.0	250.4	1.634	754	345.	4.607	-8-573		ال الرازي الرازي	065	770-27	0.0
100 K		16.84		3-856	4.637	757	252	3-720			1	1	222.078	
हें दें हैं के	5.20	2.44.5		1 1 0 ° C	1.603	754	35.	3-710	200	3.313	3.363	290	-22-078	2104-
				4	4							l i		

### BEST AVAILABLE MORY

Table B-3

# 4.2-inch M328A1 without extension

1	ICIAL LENGTH A-BDO	37	ACSE LENGTH LABSO	EGAT TARE LENGTO		CG (FW NOSE)	20 S	E MERCHAN COMPANIES COMPAN	25.00 P. 1		NOSE REDIUS 2,500	i	PC0% LENGTH .700	:
CIAMETER INCHES 4.193		IX LE-IX-SQ 67,000	IY LE-IN-SC 800,000		#E16HT LES 27.800	4.50 4.50	61h Tw197 Cal / Tunh 20+040	ACTUAL TWIS' CALZTICN ZGANGO	AL TWIST L/71 GN 20.000	6UN-EC95 INCHES 4.191	A A C O III	TEVPENANUPE DEG-F E9 000	AIP DENSITY SLUGSZET****	> ι • • α ι • α Θ.
			AEFC	0 01+6,40	CLFF1CIE	AEFOCY, JAIC COLFICTENTS (HATE COEFFICIE'T'S BASED		SAE STA	314 A NO 3	(0/2/0) 6	!	:	:	:
MACE	ង	. 5x2	!	5	ξ6.)	CYEA	C 3.P.A	CA845	ChDAS	(67(1)	CPF (51	C554(5)	0 2 0	ź
0.00	197		1 *0 * 0	200 m	196	7.5	1 1	0 to 0 to 0	-897.000	5 C C C C C C C C C C C C C C C C C C C	3.176	.152	-6.046	. O
.800	500	3.684		1	36.		1.00 m	84.917	-911-6-5	2.678	3.678	525	9.0	.0.
589		45,525	2.122	en 4 en 4 en 4 en 4 en 4 en 4 en 4 en 4	د. در ه در در	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	(4) (4) (4) (4)	61.543	500.000	7 C C C C	ر. در در در در در	0000	956.6.	11 11 11 11 11 11 11 11 11 11 11 11 11
200	1	1 2 2 2 2	ı		400	-1.608	900	31,133	156.463-	3/200		105	-16.569	
1.050	9 - 2	6.000 A		ou . Sid	1 2 4 4 1	2.5°	G	17,850	-161-000	4. T. T. T. T. T. T. T. T. T. T. T. T. T.	3,50	 	-16.618	\ \frac{1}{2}
200	614	2.55		307.6	1,370	34.6	010	1	-60.733	1 (U) (U) (U) (U) (U) (U) (U) (U) (U) (U)	) () () () ()	505	-20,652	1 (3)
1,350		-6.712	24482	4.50.4	1.351	-,768	-22F	-1117	-43.667	3.575	3.376	505	-22.079	0/0-
1.500	. 5 G 3	9.07C		10 XV 4	1,343	76A	÷53*	7.263	-38-133	3. Y 8 8	3.37R	505.	-23.411	0/0" -
		1. T	1	4.46.0	00 · ·	00 00	*544	0 - L - L - L - L - L - L - L - L - L -	-26-600	30 (C) (C) (C) (C) (C) (C) (C) (C) (C) (C)	30 CO CO CO CO CO CO CO CO CO CO CO CO CO	50.	11.4.00	ن ر ب. ا
. r	1000	1 U	0 - 1 10 - 1 0 - 1	0.4	27.5	D 44	, , , , , , , ,	0.5	100 10 T	υ α 2	יי יי יי	n ()	114.62	
3.030	a.	2,539		5.102	0.00	1 22 1	767	. 650	000-1-	) a:	1 d1		-23.433	
2000	0.5	77.7	35,54	550.8	1 - 2 7 9	1, 1,	1697	(A)	000.1-	3-55	3,370	502.	-53.411	-117
2.000	6.60	13.	r. La NI	4.936	3.240	768	642.	4	-1.000	3.56	3.378	\$00.	-23.411	6100-
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Table B-4

## 4.2-inch M328A1 with extension

Canada   C	Carlow   C	La-In-c     La-I		TC TAL 4.710	LEN LEN	ACSE LEACIF 1.950	FCAT TALL		CG (Fr NOSE) 2.9-0	PEPU DI 01696"E9 • 133	: N1 E : E 4 I 3 3	PANC Clareter 1.014	<u>a</u> .	005E + 401C 4 + 200	٠ <b>٠</b> ا	LENGT- 1.400	
CXZ CXA CYNA CCAN CON CYNA CANAS CAN	CX CX2 CAA ("10 COPFICIENTS ("ATF CUEFFICIENTS CAAAA CAAAAA CAAAA CAAAA CAAAA CAAAA CAAAA CAAAA CAAAAA CAAAAA CAAAAA CAAAAA CAAAAA CAAAAA CAAAAA CAAAA	CA CAS CAPA COPA CONTROLLED TO EASE CAPA COPT ()  CA CAS CAPA CAPA CAPA CAPA CAPA CAPA CAP	1AMETES INCHES A 151		120			# <b>£1</b> 6E1 — 249 — 2480	7777 7777	ļ	-45TLAL_1 CAL/TU 20.0	000 000	CUN-ECRE INCHES 4.153	16.4PI	Ralufe 6-6 1.000	A16 DEN SLUGS/P	# H B
CX CX2 CAA Cub (PA Cypa (Nea Cypa) (PFF) (PFF) (PPF) (	CX CX2 CAA CYA CYA CYA CYA CAA CAA CAA CAA CAA	CX CXZ CAA CAA CAA CAA CAA CAAA CAAA CAA				AFFO	CYNAMIC CC	FFFICIEN	15 twaff C	JUEFF 10 16	13889 514	CON MATE	( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (		ļ	!	
18.1   2.865   2.055   3.105   1.170   -755   -159   91.650   -875,4400   2.053   3.162   1.137   -4.815   1.152   -159   91.650   -875,4400   2.053   3.152   -4.815   -4.8	18.1   2.865   2.055   3.105   3.155	18.2   2.05c   2.10c   1.170   -7.5c   2.15   2.1	1 2	5	213	4 5	4.5	!  ජි 	44.0	(AF.34)	CAFA3	CAPAS	(PF(1)	CPF (5.)	(8149A)	) (FC	5 -
18.3   2.865   2.852   1.187   1.187   1.284   2.843   2.864   2.864   3.282   2.865	18.1   2.865   2.057   3.157   1.057	2.00	9	183	2 -865 .	250-2	3.800	1.170	750	-,691	9),690	-674.400	14 C	3.163	138		
200	200 2.177 4.121 1.129244255 0.0813 -571.453 2.663 3.313 3.289 -7.800 2.569 3.313 3.289 3.2	200 2-177 4-121 1-129255 60-813 -571-8-3 2-662 3-323 -415-10-10-10-10-10-10-10-10-10-10-10-10-10-	. 600	183	2.00		1000		1 3 1	4 (* 4) (* 4) (* 4)	83.317	- 795 . 667	2.263	3.263	6213	4.4.15	9 C O
10   10   10   10   10   10   10   10	10	10   10   10   10   10   10   10   10		4	200.5	- <b>4.1.</b>	120.4	125	L J	562	60.813	-570.633	2,662	3,313	• 282	-7.805	
		19   5.007   2.239   4.167   1.115	00.5	013		202	4-10	-1-116		310		-439 B00	- 5.56.7		,	- 15.5	
446 6.157 2.313 3.562 1.277 1.315 1.313 594.23 3.613 3.363 2.25 17.446 1.577 1.315 1	446 6157 2.313 3.562 1.277 1.315 1.313 1.513 3.5	466 6157 2.313 3.552 17.446  466 6157 2.313 3.55	1.000	162.	5.007	5.533	4.167	500	ታ ያ 1 1 1 1	2.0.		-257.003	10.4	1 E E		-15-578	•
*** *** *** *** *** *** *** *** *** **	466 6.157 2.94 2.56 1.56 1.75 1.95 1.51 2.54 3.363 2.563 3.363 2.564 1.207 2.645 6.19.307 2.645 6.19.307 2.645 6.19.307 2.645 6.19.307 2.645 6.19.307 2.645 6.19.307 2.645 6.19.307 2.20.645 2.2	#46¢ 6.157 2.74 2.05 1.57 1.754 1.95 5.03 1.5243 3.363 2.26 3.363 2.26 19.307 2.66 1.314 2.05 19.307 2.20 19.307 2	-950-	597	- S. S. E.	m :	3 = 3 to 1	167.1	n 11 n 3 u 4 i 1	2		C C 1 - 1 - 1 - 1	2.613	3.363		-17.446	-:
456 6-154 7-454 4-144 - 712 7-454 - 42-45 3-152 3-152 3-154 7-154	495 6-154 7-454 4-154 1-314 1-754 -21-3-144 1-3-2-3-3-3-3-3-3-3-3-3-3-3-3-3-3-3-3-3-	450 6-154 7-454 4-104 1-314 1-	1.100	4.56	•	. 11. 7	) d	1.00.1	151	36		E18.85-	5.245	3.363		-19.307	0.70
# # # # # # # # # # # # # # # # # # #	# # # # # # # # # # # # # # # # # # #	# 19	250	057	41.60	1 0 5 5 1 W	4.145	1.319	/-	-213	1.557	-42.067	5.65.5	3,363	0.0	-26.733	0 0
# 10	405 4:34 4:20 1:44 -:754 4:20 2:35 3:35 3:35 3:35 3:35 3:35 3:35 3:35	-405	994		4	1000	- 4.65.4	895-1	447	- 125	- 5117-			1	000	- 22 066	
334 4.556 4.556 4.55154 .245 3.445 3.503 3.363 3.363 3.365 .25.066 3.377 3.353 3.353 3.363 3.	334 4.55 4.05 4.05 1.52154 2.0 3.30 3.30 3.30 3.30 3.30 3.30 3.30	334 4.55 4.55 4.55 7.57 7.57 7.57 7.57 7.5	1.750	405		( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	4.203	1.445	1.7.4	u i	5.542 5.42	-25.350		5.45.5	1	-22.046	
317 3.555 7.965 4.075 1.666774 4.417200 3.213 3.36228922.666	3.555 ; 3.656 4.0°5 ] 3.660 - 3.74 4.4 4.417 - 200 3.213 3.362 - 22.066 - 2	317 3.555 7.965 4.0°5 1.600 - 1.74 4.617 - 200 3.313 3.363 .289 .22.066 .22.066 .231 3.363 .289 .22.066 .22.066 .231 3.363 .289 .22.066 .231 3.363 .289 .22.066 .231 3.363 .289 .22.066 .231 3.363 .289 .22.066 .231 3.363 .289 .22.066	900	17.	1 4 4 4 5 7	- K . F. S. E.	4.565	1.521	451-	) .	U	7 th 0 0 1	3 C 4 C 4 C	) ( ) ( ) (	100	-22.066	
-211 -2451 -2752 -4.005 -1.513 -1.54 -2.10 -1.70 -2.00 -2.13 -2.006 -22.006 -22.006 -2.13 -2.006 -2.006 -2.006 -2.106 -2.006 -2.	- 211	234 2442 24046 1-653254 251 3-770200 3-313 3-36322-066255 251 3-770200 3-313 3-363269 22-066255 251 3-770200 3-313 3-363269 22-066269 25-066 25-066269 25-	2.5.0	170.	3,555	595.	4.00	1.50.0	7	7.0	4.01	0 0 0	, ,		289	-22.066	•
735 2142 3.677 3.95¢ 1.567754 .C21 2.770 .200 3.213 3.363 .224 -22.026	735 2.442 3.677 3.956 1.567754	-235 2:442 3:677 2:95¢ 1:563 -:754	988	77.	4		- 590.4	-1-633	31 3	107	) · ·	000		100	50.2	-22.066	:
			4.000	\$65.	2 * 4, * 6.	21875	3.954	1.663	3.7	162.			1 6	2 2 4 5	3	-22.056	•
			888	+	+				457					1			

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Table B-5

4.2-inch M335A1 without extension

:	TCTAL LENGTH		NCSE FNGTH 1.P50	PCA" TAIL LEVOTE Q 0000	1	CG (FM NOTE) 2.910	014	NEPLAT 01AMETER 131	BANC DIAMETER	£.	RADIUS 2.500		EOOF 700	
IANE TER IACHES 4.191	<b>a</b>	1x LB-IX-SC 62.600	17 LE-IN-900 800,000	9 o o c	₩EIGHT LAS 26.470	10 O .	SIN TMTST CALZTURA 20.000	ACTUAL TWIST CALTUAN 20.000	T#751 CAN 000	GUN-ECFF INCPES 4-191		IEWPERATURE DEG-F 59.000	AIR DENSITY SLUGS/FT**3	7 F # 3
	 	!	#EB(	 DEVNAMIC :	AEDOEVNAMIC CCEFFICIENT	٠,	COFFF 14.11	NTS BASE	CHATE COFFICIENTS BASED ON NATE	• (C/2V))		'   		
7. A.Y.	5	CX2	440	3	Ag S	CVPA	CNPA	CNFA3	SAPA,	CPF [1]	CPF (51	CNP#[5]	9	נר
010.	161.	3.116	2.041	4.116	154.	748	635	93.450	-857.000	2.C78	3.178	. 205	-7.130	032
600	181	3,11	- 2,041	06.4.6.	. 1981	- 1768	t 35	93.450	-897,000	2.C78	3.176	.205	-7.130	03
.eoo	.603	3.589	2.0e1	4 . 2 . 1	.861	748	486	8: 517	-811.667	31515	3.278	. 582	-7.130	- 03
- 005	237	4.225	2.122	4.1.4	d 76 *	4.72	201	61.583	-582,333	2.678	3,328	.361	-10.087	02
045.	182	4.786	2.150	4.154	.98°	-1.104	.075	44.650	000*655-	2.57E	3.37e	.516	-14.979	02
1,000	.463	5.415	Z. 15P	4.1.34	1.037	10::•1-	. 165	32,183	-254.333	3.078	3.378	125.	-17.602	02
1.050	.618	6 176	5.247	3.300	1.441	216*-	.244	19.850	-161-000	3.178	3,378	424	-17.841	C.
1.100.	621	41449	2.278	1,497	70701	1.864	462.	13.583	-102 - 333	3,528	3.378	404	-19,752	Zv*-
1.500	1	7,354	2.36.	E	1.376	7.8	.267	C.823	-50.733	3.258	3.376	•328	-21.632	- 05
1.350	, in the second	0.715	10447	3.871	1.351	768	+ 282	6.117	-43.667	3.578	3.378	.159	-25.879	0.0
1.500	185.	0.0.9	424.2	4.17	1.343	768	562		-35.133	3.088	3.37e	359	-53,888	- 0 5
1.750	1.4.0	5.444	6.75	4.21.8	1.364	766	16?		-26.660	2.556	3.378	.359	-23.888	05
2.000	505.	7 d 4	\ da • \	4.36.	1.384	768	306		-18.067	3,308	3.378	359	-23,888	10.
2.500	4.54.	3,955	3+04)	0,9	1.74	748	. 312		-9.533	3.318	3.376	• 35 9	-23,888	-101
3.000	470.	3.275	3.451	4.886	1.3CP	748	121		-1.000	3.28	3.378	359	-23.888	1
000.4	.310	2.7:0	5,951	4.8.6	1.278	7¢B	.321		-1.000	3,328	3,376	• 359	-23,888	[[]
5.009	9	2.141	2.851	5:2.4	1.248	7+B	.321	3.85	000-1-	3+:2B	3.376	956	-23.688	16.

Table B-6 4.2-inch M335A1 with extension

		Carrier   Carr		1510L	NCSE LFNGT	ACSE FACTO 1.950	FCAT TAIL LENGIT	;	C'. IFR NUSEJ 2,410	134	PEFLET DIPPETEY	BANC GIAMETER 1.014	84.4	NOSF E-21LS 4,200	7:	800° LENGIH 1.600	
C	Carlon   Corrections   Carlon   Carlo	C	16.16							121.01	18 11 JA	18181	GUN-EOFE INCHES	16 25	PERATURE DEG-F	SLUGS F	11003
##C	## C	#### CX C77 (Che ; we (Ph C7FF (CFF)) CFF (CFF)	151 7 4 151	3,   	18-50 3-100	E07.0	در 00	25700		000.0	۲,	000	151.5		060,460	9	
## C	### CT	##CF (X CT) (No Central Central Chemics (Pert 1 (Perts) (No Central Chemics) (No Central Chem				4640	CYNBMIC	CEFFICIEN	319A) SI	CGEFFJCD	ENTS BASE	C CN PATE	(1.270)				
10	10	10						465	197.2	APA	CNFA3	CNPAS	l	CPF [5]	CNPA(5)	C#0	10.
10	10	10	FACI		(1)	0 4 A D C A	3.653	-1.170	1.354	636		0044623-	2,063	3,163	161	-5,857	:
100   110   12462   2.115   1.124   1.125	100   111   12465   2.115   3.415	1000   11	9 4	* C1	2,855	550.2	2.674	1.160	754	1 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		-195,567	2.263	3.263-	- 500	-5.857	9
100   110	10.00	1000   1701   1702   1702   1703   1704   1705	90 4		(1) (2) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	2/2	, E 0	1.125	946	502		-570,633	M 4.	3.363	156	102411-	200-
0.05   0.07	1.005 .701 5.002 2.234 4.010 1.1279856 194.70 -157.200 3.442 3.343 3.344 184.18 1.007645 5.15 2.342 3.184 1.270 2.250 3.341 3.20.20.20.20.20.20.20.20.20.20.20.20.20.	1,000   1,01	01.5	3 1		202	3,94		- 1 . uB 3	157	32.55	-239,033	2,063	3,363	844	-16,323	
10.00   466   55.56   55.75   57.75   55.7   57.713   57.65   57.55	1.0+0	10.00   44.6   5.55   7.57   7.59   7.54   7.59   7.54   7.59   7.55	1.000	15:	2.002	56345	010.4	511.	655 T	928	15.470		5446		384	-18.418	020
1110	1110	1100	940.	164	- 5.54.7 - 2.5.7	215	44.0	1.279	979	55.	13,713		3.643	3,363-	341-	-20-246	ä
	. 450 6.154 6.454 1.050 1.054 1.22.502		7	-	14. P	156.3	1593	4.20	407	1990	7,557		E 92.	3,363	341	-22.502	020
-405 4.914 2.739 4.011 1.445 -754 -285 -7407 -2573 3.341 -22.5502 -73.4 4.011 2.455 -7.000 3.000	**************************************	**************************************	75.		451.0	2.4.5	4.050	836	48.	7.0	P44.5	1	7.583	3,363	.341	-22.502	. 919
127 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	324 4.657 - 4.541 - 7.545 - 1.544 - 7.54 - 7	324   4,541   -2,655   -1,545   -1,54   -1,54   -1,54   -1,54   -1,54   -1,54   -1,54   -2,5	4 -	109	3	5-11-2	4.011	1.445	J 10 F	. 283	n		3.293	323	1341	-222525	9
. 227 3.555 6.757 3.757 4.633 7.554 3.770201 3.313 3.363 3.341 -22.502 3.313 3.363 3.341 -22.502 3.313 3.363 3.341 -22.502 3.313 3.363 3.341 -22.502 3.313 3.363 3.341 -22.502 3.313 3.363 3.	. 227 3.555 5.507 3.341 -22.502 3.313 3.363 3.341 -22.502 3.313 3.341 -22.502 3.341 -22.502 3.341 -22.502 3.341 -22.502 3.341 -22.502 3.	132 3.55 5.50 3.213 3.63 3.41 -22.502 3.213 3.63 3.41 -22.502 5.25 5.25 5.25 5.25 5.25 5.25 5.2	- 5 - 6 0 0	326	4.251		335	1.56.	756	296	4.607		E 0 0 0 0	3,363	145	22.502	510.
. 234 2.44 2.87 3.755 1.643 .754 .304 3.770200 3.313 3.363 .354 .354 .354 .354 .354 .354 .354 .35	. 23	. 23	2.500	125.	ال ال ال ال ال ال ال ال ال ال ال ال ال ا	, , , , , , , , , , , , , , , , , , ,	3.757	7	756	400	- 3 770	1		3,363	.341	-22,502	017
			000	553.	2,44 €	5 P 2	3,755	1.50	457.	7000	27.50		1311	3,363	45.	205-22-	9
			8														

Table B-7

1

4.2-inch M329A2 (M329A1E1)

	101AL	N C	NCSE FACIL	ECAT TAIL		CG LFH MOSEJ	7 LAP	PEPLAT CLANETER	BUNC CIAMETER		NOSE	-	LENGTH	
	4.102	2.	2.354	.663		2.517		.131	1.014	,	5.800		.695	i   
231 388 17.		× 1:	7.		149134	C.10	נצויו עום	ACILAL	1siai	SUN-EGEF	15 v P	EVPERATURE	AIR CEN	CENSITY
INCHES	-a1	-14-5C	000**t*		1.45 20.626	Cal.	Cal/Tueh Zospoo	CAL/TLWN 20±000	1 000	1hCHES 4.151.	0 4	0EG-F 57.000	SLUGS/FT**	3.5
				AEPOCYNAMIC CC	EFF ICIEN	CCEFFICIENTS (487E COEFFICIENTS EASED	COEFFICIE	ATS EASE	C Ch 45TE	((V5/0)		:	İ	:
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5	Cx2	CAA	CHA	Vaj	CYFA	CNPA	CNFA3		(111	CPF[5]	i	3H)	ر ر ر
010	0.84	2.254		13.384		E 5/2	277	75-800	-760.502	409.5	. 1.7¢	2 3 C (1	10.107	, , ,
.400	*00.	2.254	1,352	3.404 4.04	2,00	1 1		72.400		080	3.264		-10.10	970
005.	0,1.0	3.366	1.477	4.018	551	500	1	605*25	-451.553	2.655	3.27	4.00	-11.547	27
*	3	77.7	777	455-5	486	0.00	935	215-19	-177.569	2.526	25.7	646	-13-4/9	2 -
000.	146	4.05.7 7.05.7	7.037	3.34	151	0440	1 7 T	16.503	-131,529	27.0.5	, 42 , 43 , 43	963¢	-15.511	-
1-100	416	5.057	2.263	2.813	1.274	425	.520	11.689	-61.353	2.148	3,282	.631	-16.002	7.10
- 502-	104	3.5€€	5.373	5.347	1.575	143	3	400.00		3.246	- Jan 35.2	4620	16.20.9	77.
1.350	ນາ ( ຕ•	500.5	2	5 2 5 ° 2	575 · 1	7		7.7		1,554	100	629	-9-711	
052	7.75	3.956	2.705	192.2	1.489	743	566	5,417	-16.673	3.282	3.352	.620	-5.711	71
90.7	912	305.0	2 + 7 4 E	. 4.773	1.567		16.15	4.688	5.380	0524	7.5	0 0 0	-5.711	
2.500	. 286 	2.710	100	3.045	1,7	. 743	U U U	دار در در در در	100	V V V V V	7 T	670	17.6.	
900	3	755	4 5 C	1,59.7	, 544 1044 1044 1044	743	) () () () () () ()	3.236	5.204	3.206	3.35.5	629		5
		3	859	5.936	150		735	2,230	5.204	302.6	325.6	- 2534 -	-9-711	7
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### Table B-8 105mm M1 (HE)

	TC14L EAC18 4.715	A L	NOSE FAGIR:	FC#1 THIL.		- (FM hOSE) 3.010	C14.	C144LTE*	C.18WE]EH	υ T	6.174	<b>- 3</b>	FC0* LEVE:T	:
AKE 15 C		1.8		: !		CLA	- ISI <b>41</b> 410	ISINI TWILTE	1514	GUN-ECAS	15.0	TE*PEHATURE	AIR CENSITY	114
NC+ES	- 0.1 	10-11-5G	LE-1N-7C	9-	31,000	C ( L )	C*L/1UM	CAL/TUCK 18.000	, c. y	INCHES 4.130	ای ب ا ا	DE6-F 55.000	SLUGS/FT*	( <b>*</b>
			0e34	CYNAMIC S	CEFFICIEN	MEPOCYNAMIC CCEFFICIENTS IMATE CCEFFICIENTS BASEC ON RATE	CEFF ICIE	115 BASEZ	Ch RATE				-	
1 J 4 7	5	CXZ	3	N.O	Aq.	6.00	CAPA		CAPAS	CPF(1)	( S) Jd2	1	010	ت
9.00	127	3		A-120.	515	E024	199-		-680.378	. A. 4.0t	3465	6.0	-7-120	
0.6	127	2.578	1.675	4.606	105.	0.00.			756.556	2.40	13.00 V		-7:120	0
105	44.	3.792	1.736	4.727	.267	- F57	nS	6n.878	-571.283	2.55	3.566		-3.406	0.0
1	45	14.7.4	4	158	747	-1.13	197	- 1	4.5-211	3-154	3.52.6	1	-110812	)     
1.000	- 1 - 1 - 1	4.627	0.0.0	050.4	.034	5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	37.5	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	157.41)	200	100 100 100 100 100 100 100 100 100 100	0 to 4.	15.200	200
	1 55.4	 			1	. H57	4		-59.783	3.475	3.614		-16,509	0.0
200	3 5	200		4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	843	264	543.5	-58.950	3.564	3.657		=17,752 -	0.70
1.350	4	5.675	5.457	126.0	1,355	e. 3	111	7.566	-42,156	3,563	3.657	.520	17.608	0.0
1 500	305	5.052		27/12	14655	£.10, 4	524	-2,122	177-51-	3.572	3.957	- 1	-17-493	504
1.750	275	4.526	5.671	555.0	955.1	813	454.	6.549	-25.351	3.582	3.657	.520	-17.393	0.00
2,000	355	3-86	2,785	36/5	- 518-1	- E08.		15+45	-17.009-	1551	1-657		17-393	576
2.500	.310	3,204	515.5	3.840	1.651	J. 1.	474.	4.tl3	-8.621	3.601	3,657		-17.395	870
99996	1992	2,644	2,857	36:36	177	Endy.	- 384	47.74	445.	-3-610.	3,857	- {	-17-393	
4.000	16.5.	2.169	2.797	3.651	1.451	E 12.	\$94.	3.774	244	3.410	3,657	.520	-17.393	117
F. 888	985		2562	1	1044	£084	-484	477.6-	44,500	2610	7346	923	-17-353	3100

Table B-9

### 105mm M60 (WP)

	TCTAL 1.EMCTH -	NC	ACSE LEAGIR Z.SEO	ECAT TAIL		C6 -(FM NCSE) 3.010		PEPLAT DIAMETER	BANG DIAMETER 1.015	E	0.174	70	LENGTH 0.000	
		:	2			; <u> </u>	15141 415	\$CILA	1.151	GUA-ECHE	16×P	TENPERATURE	AIR DENSITY	SITY
INCPES 1 APPLIAN	61	L2-11-c1 82-380	LB-1N-5G	00	34.800	100	CAL / TUMN 12,000	CAL/TURN	000	1ACFES 4+1.30		0EG-F 59.000	SLUGS/F1**3	1 2 # 3 3 £
			AFL	AFHOCYNAMIC COEFFICIENTS (WATE	CEFFICIEN	3194) SI	CCEFFICIENTS	ENTS BASED	C Ch PATE	- (0/2/1)				
	,		1	4 3 0	400	91.5	1 0 V	CNFA3	CNPAS	(PF (1)	CPF[5]	CNPA[5]	CMO	a To
1 10	152	25.5	2 3 6 7 5	4-180	u1 51 4	E03	461.1.		-BE0.378	2.436	3,469	.369	-7.120	1:0
• € 0.0	.127	2.576	1.675	4.203	.501	Kn3	401		-880.378	2.436	3.469	9369	-7-120	150
994-	951	3,124	1-665	4417	404	E 0 X + 1	315.	47 4.00	-571.283	2552	3.566	654.	-9.406	025
005.	4	707	400	701.4	747	11.1.3	5 col .		-640.311	1-154	3.537	- 1	-11.810	022
1.000	7	4.628	0.50.2	200.1	1.034	-1.035	37.5		-284.383	3.578	4.00		-15-697	120
1-080-	6	5.20E	7,00	3-344		04×+1	7375	157.51	-157.411	7.406	1774		7.5.600	020
1.100	4 (1)	5,663	5.45	3.757	1.330	י ער טיי פר ער פר פר פר פר פר פר פר פר פר פר פר פר פר	7 7	13.728	7 10 0 10 1	4.00	1.657		-17.792	020
1.350	77.	5.675	2.427	126°E	1.395	E 1 2 1 1	77	7.566	-42.156	13.00 10.00	3,657	.526	-17.608	••050
1	355	- 54.46	1955	- 3-923 -	155	502	4 4	7-127	3 1- 773	77.	1505		17 703	210
1.750	375.	535	5.671	5 6 41 9 5 1	1.529		\$ c. 4.	0 x 2 y 3	-25.351	7.55	3,617	0 2 0	-17,393	510
5.000	: 1 1 1 1 1 1 1 1				7 10 4	7 ~ 0 1	12.1	4 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	- 18.62	3.603	3.657		-17.393	016
001.0	01:	3.004	2.862	7.734	12721	- 813	2119	177	24.4	1.610	3.657	1520	-17,393	017
000.4	1000	2.169	151.2	3.651	1.51	₩ L	.4H2	2.174	-+544	3.610	3.657	523	-17.393	013
900.5	100	1,34	12908	3.04.5	1.660	£020-	28182	3274	-4244	7.610		0250	1	3
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Table B-10

## 105mm M60 (gas or smoke)

	The control of the		TC: 4.	ż	150¥	PCAT 151		) ] ]	"	*E.31 A.T	747		7000		1.000	
			4.715			161617		FM MUSE)	οτο	4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Diaper.	7EF	8AD145 6.174	0	1 EAG TH	
1	10-10-61   10-10-62   10-20	C. 1 AN E. 1 E. L.		11	:		13									
10   10   10   10   10   10   10   10	19-100   1	JACHA	i	-18-41.	1	٥.		13	1		151	GUN-ECFE	1EW	PERATURE	AIR DE	,S11,
Continue   Continue	Care   Care	4.130	:	76-100	187.6	. 000	35.000	ر ا	0000	16.	000		!	06.6-F 52-000	SLUGS/	228
C   C   C   C   C   C   C   C   C   C	123   2-576   1-676   1-677   1-678			1	AFLO	CYNAMIC CO	CEFF ICIEN	4 1 4 - 1	CLEFFICIE	ENTS BASE	C CN FAIR					
13   2.57   1.67   4.227   5.51   -1.67   -1	1, 2, 5, 5, 1, 1, 4, 5, 4, 2, 4, 5, 1, 2, 1, 2, 3, 3, 1, 2, 2, 3, 1, 4, 5, 3, 1, 1, 1, 2, 4, 5, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	r PC I	J	CxS	4 4 O	ŶŦŨ	A.	CYPA	CAPA	E A TA	CAPAS		1.0615	1		
18		010		2.576	1.675	4 - 24.7	5.5	F 32	767	91.788	-820-37B		3,469		24.41	
14	14   17   17   17   17   17   17   17	000	121.	7.5.7 4.0.4	1,676	4 . 2. 4. 5	1,5.	E 0 2 2 4 1	. 6	91.788			3.469		-6.453	
15	14	3057	4	3.707	1.774	1, 1, 1	100	  	4.0	83.405	-796.556	2.£24	3.563	.412.	-6.452	- 030
19   19   19   19   19   19   19   19	4   4   6   5   6   6   6   6   6   6   6   6	069	100		3,3	4	26.	~ c	1000		-571.243	1 N 1 N 1 N 1 N 1 N 1 N 1 N 1 N 1 N 1 N	3.566	.463	-8-760	03
1.493	-433 5.206 2.044 5.423 1.413 1.470 1.570 1.470 3.470 3.554 1.515 1	1.000	1 %: •	454.4	0.50 · 5	2 T. 4	1.034	7 -	3,75		200 202	ļ	16537	552	-11-16B	20.4
**************************************	4413 5.481 2.243 3.451 1.337451 375 12.728 -99.783 3.452 3.644 -505 481 1.352 -12.4	1.04.0	£ 6 4 .	5.266	£ • 0 54	4 4 4 4	1040	V. 2. 4. 1					100 m	533	-15.069	20.
		1.100	£. 7°	ν. π.	5 + 2 + 2	1-01 1-01 1-01	1.32	~ 51.	.375		000		1 41 4 . 6	100	100	96
1,000	1.506   -42.15   3.657   -40.16   1.595   -1.709   -1.7099   -1.	1-240	Į.	1	E+317	- 3 <del>* 66</del> 3	4 + 34 t	- **6.3	36.	649	-58.976	340.6	7.99		10.001	200
375   4.552   5.651   4.066   5.654   4.021   11.27   11.27   11.27   11.021     375   4.552   5.657   4.016   5.657   4.021   11.021     376   3.657   4.016   5.697   11.021   12.65   3.657   4.021     376   3.657   3.657   3.657   3.657   3.657   3.657   3.657   3.657     370   3.647   3.657   3.657   3.657   3.657   3.657   3.657   3.657   3.657     371   3.657   3.6	175   4,522   2,671   4,046   1,589   -17,314   1,27   -13,471   1,27   -17,070     176   1,27   -1,	0000	3 ; (	5.4.5 5.7.5 5.7.5	7:4:2	3.0.4	366.	E . F . I	214.	995.	-42.155	3.63	3.657	1	-: 7.099	200
1,500   1,50	10   10   10   10   10   10   10   10	1 2 50	27.5	1 2 3 4			1		421		-13-773	3.572_	3.657		-17.070	
-310 3-204 2-517 3-527 1-516	3.204   2.504   2.657   1.651   -1.203   3.657   -1.603   -1.603   -1.603   -1.603   -1.603   -1.603   -1.603   -1.603   -1	4	35.	2.40	1000	10 · ·	1	n i	.427	S 1 1 1 1 1	-25.351	3.582	3.657		-17,070	-
764 2,444 2,857 1,751 1,751 1,751 1,751 1,752 1,751 1,752 1,752 1,752 1,753 1,	784 2-444 2-847 1-7-1 -453 4-55 1-7-1 3-65 1 -467 1-7-070 1 -7-1 1 -467 1-7-070 1 -7-1	2005	015	7.2(4	* 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10	100	+		36.44	5.451	17-009	-3-591	-3.652.	1981	-17.070	01
-21 2.165 2.747 3.803 1.651 -3.633 450 -3.744 3.615 3.657 487 -17.070 3.653 3.657 487 -17.070 3.653 3.	-244 3.615 3.657 -247 -244 3.615 3.657 -17.070 -244 3.615 3.657 -487 -17.070 -244 3.615 3.	368	1	444	2 7 6 7	1 11		٦ ، ن	3	£ 4 • 1	-H-627	3.601	3.657	467	-17.070	.01
706 1665 7.692 7.150 1.660	7.595 7.692 7.750 1.650 1.650 1.744 7.615 3.657 .487 -17.070	000	15.23	2,165	757	100		7 7 7 1	7	477	24*	-3-610	3.657		-17,070	9
		5,000	- 505-	339	2697	7.75	949	5 July 1		7,7	757	0 0	3.657		-17.070	- 07
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Table B-11 105mm M84, B1, BE (smoke)

	4,520 4,520 4,520 1,420	7 1 1 1		1 ENGIE	1   .	2.830		32	1.015		6.174	  -	000	İ
The control of the	11x LA-1N CX CX	050	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											
CX CXE CX CX CX CX CX CX CX CX CX CX CX CX CX	18-1N 18-1N 18-1N	08.	LB-1N-50			410	Lust	ACILAL	151	GUN-ECEF	TEVP	HAT JE	AIR CEN	<u> </u>
CX CXZ CX1 CHA CPP CNPA CNPA CNPS CNPS CNPS CNPS CNPS CNPS CNPS CNPS	060 060		4.13.4 uu	ļ	36.5.5 32.5.90	CAL	1 July 1	CAL/TU	100 100	INCTES - 4.130	2 10	000	0003	
CX CXC CX1 CWA CPA CYPA CYPA CYPA CYPAS CY	X ) 0		AEROE'Y	TABLIC CCE	FFICIENT	IS (ADTE C		TS BASEC				!	i :	
090         24.30         1.464         2.65         1.92         2.30         2.44         2.66         3.377         4.37         9.25           0         090         2.430         1.444         2.86         1.82         2.10         2.342         3.466         2.81         1.348         3.466         3.51         1.31,03         3.466         3.466         3.51         1.10         3.426         3.466	080	C X 7	3	CHA	١	CYPA	CAPA		CAPAS	(Pf[1]	CPF 15 1	CNPA(5)	CM0 -9.225	000
100   2.430   1.444   4.45		24.30	4.44.4	258.6	- 34.	95/	360		644.200	2.575	3.377	7:4.	-9.225	0.0
114 3.516 1.545 4.475 -0.06889 .021 5.473 5.474.3 3.143 3.545 .607 15.435 .16.435 .17.4 3.545 .20.4 3.143 3.516 1.545 .20.4 3.143 3.143 3.456 .20.4 3.456 .3456 .3456 .3456 .3456 .3456 .352 .3456 .3526 .3526 .3456 .3526 .3456 .3526	060.	2.430	7.7	2505	1 7 7	652**	1	.Ba. 117 -	-763.667	2.554	1. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.	135	-11.039	7.0
110 1,021 1,124 1,125 1,	114	3.516	2,00	4.475	0t8	683			-421.400	503-1	3,383	.617	-13.160	120
10   1256   2123   2175   1.056   -819   -472   11.113   1.124   -13.55   3.456   -15.610   -17.59   -15.610   -17.59   -15.610   -17.59   -15.610   -17.59   -17.5	97.	720	1.975	4.173	12.	-1.025			-275-433		3.460	600	-15.715	020
393 5.332 2.204 3.450 11.47 -007 3.59 3.247 2.44.973 3.4450 3.559 3.582 117.359 3.599 3.593 5.332 4.20 3.550 11.47 -007 3.590 1.47 -0.460 3.559 3.559 3.590 1.395 3.590 3.590 1.397 3.590 1.397 3.590 1.395 3.590 1.395 3.590 1.395 3.590 1.395 3.590 1.395 3.590 3.490 1.395 3.590 1.395 3.590 3.490 3.490	200	135	2.123	3.775	1.050	- 935	- 27.7		-94.233	10	3.456	255	-16.610	10:
1981   1982   1983   1984   1985	665	5.336	2,204	3,720	1.146	759	6,		54.973	32445.	555.5	6.0 6.0 7.0 7.0	17,359	5 TO
13.05	200	7.26.	2.7.2	2,593	1.377	651	٠. ٠.		-38.867	204.4	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10,4	-13.956	510-
337 4.182 2.700 3.450 1.527 5.52 5.221 5.44.727 3.455 3.555 5.227 5.34.727 3.455 3.555 5.527 5.34.727 5.455 3.555 5.527 5.34.755 5.5	200	15	3.517	464	924	754		4.026	-22.760	3.486	3,559	5 A 2	-13,956	
283   2,930   2,537   3,630   1,592   -,759   5,94   5,653   3,554   3,555   3,557   3,555		4.182	2.700	ար. գ.գ. Ծ.ը	7.5.7.	657	533	122.5	-14-707	22,455	3.555	C   C   C   C   C   C   C   C   C   C	-13,956 :	
. 253			1 424 6	3.636	1.592	552	\$63.	4.415	-6.653	10 10 10 10 10 10 10 10 10 10 10 10 10 1	. n . n	2 6 6	-13,956	
.218 1.967 6.803 3.454 1.557759 .544 3.610 1.4000 2.514 2.555 .542.		2413	203	3.426	-359+		- 54E	1	007	10.0	3.555	582 582	-13.956	•
		1.967	£.803	4. 10.00 10.00	1.597	952-	2 4 5	019-5	905-1	25.14	3,559	545	-13,956	-116
		1												

Table B-12 105mm M314A1E1 (illum)

4.760 1 4.760 1 1ACPES LA-1A-50 4.130 82.240	1.780	FCAT TAIL	,	90	1.65	FPLAT	BANC		NOSE		800₩	
1		00000	<b>.</b>	- (450K mg) 5.5441)	, 10	OLAMÉTER	Alametep 1.015	 	. E4DIUS		LENGT- 6.000	İ
	7.			:	 	# 0 # 1 # 0 # 0 # 0 # 0 # 0 # 0 # 0 # 0	İ	1 20				-
	LB-1N-SG 756.000		15.00¢	C11/1046	0.00	CAL/TUNA CAL/TUNA 15-8800		7ACFES	2 0 0	15	\$10GS/FT##7	5117 7413
	AEFOC	AEROCINAMIC CCER	FICIENT	CCEFFICIENTS (MATF COEFFICIENTS BASEC ON MATE . (DZZVI)	EFF ICIE	ATS BASE	C CN FATE	(142/0)	ļ	:	i	:
	CNA	CHA	463	CYPA	6.6.0	F 4 4 4 7	CADAS	(1130)	1000	1074040	0	
1	2.061	4.000	556	!	£83 _		-883.178	2.138	3.178	(6)4150	76.00	ָרָי פּי
755 5 502 003 003 ·	2000	4.021	500.			92.E6R	-÷85.178	2.C3E	3.138	151	-6.097	0
50	2.153	15.14	9 5		- - - - - - - - - - - - - - - - - - -	84.206	-804.556	.2.23E	3_23B		-6.097	0.030
-385		4.25.8	956		.003		-5//-133	an an an an an an an an	3.00	862	-9.068	0.70
044	2.240		110.		966.		-251.533	3.038	3-338	3 7	-16.588	777
1	9.5	Ī	1		-126		-159-311	101-0	4. 4. C. 4. C	0.00	000.00	100
2724	252.0		1.261		-212	•	-1-1-133	3.18	3,338		-18.723	0.20
*15.	2.535		1	1 25.0		5 - 73B.	-58.880	- 312.5-	3.336		-20.593	0.70
484	- 199-		368	ĺ			100 V VC I	1) 0			-21.919	0.00
.467	2.780	-	.37 y		545.	6.353	-26.031	3,256	3,338	103	-23.065	
1	2.857	7	4.35	747	255	5.507	-17,549	7.258	i e	100	-23.065	0.10
333	3.032		<b>205</b>	762	-55-	4.661	-9.107	3.27E	3.338	303	-23.065	0
2.85	4 0 0	2,7	 	1 27 7	265	30816		3350	3,338	F	-23,065	- 917
	2 9 16	,	\$ 15 to 1	742	100	419°0	11011	2.08E	3.328		-53,065	013
						1	3844	THIE		203	-23,065	016

 Table B-13

 105mm M444 (ICM)

Cx2 Cha Cre (CFF [CIENTS, (**1F CCEFF [CIENTE] FASEC C** BAIE  2-61E - 1.700 3.891 551 - 787 - 494 70.165 964-147  2-61E - 1.700 3.891 551 - 787 - 494 70.165 964-147  3.72E - 1.76 4.17 447 - 1.77 10.65 964-147  3.72E - 1.76 4.17 447 - 1.77 10.65 964-147  4.65 5.77 4.15 1.24 1.11 3.26 1.56 964-147  5.75 5.71 4.15 1.24 1.11 3.26 1.54 1.55 967-27  5.75 5.77 3.651 1.24 1.77 4.71 5.46 5.70 968-57  5.77 5.65 7.7 3.651 1.24 1.77 4.71 5.46 5.70 968-57  5.78 5.77 3.65 1.15 1.24 1.77 4.71 5.46 5.70 968-57  5.78 5.77 3.65 1.15 1.24 1.77 4.71 5.46 5.70 968-57  5.78 5.77 3.65 1.15 1.24 1.77 4.71 5.46 5.70 968-57  5.78 5.77 3.65 1.15 1.24 1.77 4.71 5.46 5.70 968-57  5.78 5.77 3.65 1.15 1.24 1.77 4.71 5.46 1.77 1.74 9.70 9.70 9.70 9.70 9.70 9.70 9.70 9.70
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Table B-14

### 105mm XM710 (ICM)

61A [als] 601A [als] 6171C-A CAL/10-A 19.000	
,	-
	,
AFFOCYNAMIC CCFFFICIENTS IMATE CUFFFICIENTS BASEC CH RATE	÷
CAPA3	9 1 2 0
91.788	ლეს.  -
91.798	~ ~ ~ ~ ~
60.678	152
47,781	1133
*365 32*588 *288,383	4 C C C C C C C C C C C C C C C C C C C
13.728	) ! !
5.642	- 44.3
457 7,965 -42,156	m (
682.7	~
-454	
4.613	;
	, , , , ,
504 -3.774	E. 3.

Table B-15

## 105mm M548E1 (RA off)

##CE CA _ CAZZ	TY  LBS  CALTLEN  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  LBS  CALTLEN  CALTLEN  LBS  CALTLEN  CALTLEN  LBS  CALTLEN  CALTL	G. N. T. M. S. T. L. M. S. S. S. S. S. S. S. S. S. S. S. S. S.		1 NCFES 4 - 18 S 4 - 18 S 6 - 2 S 6 - 2 S 7 - 2 S 8 - 2 S 8 - 2 S 8 - 2 S 8 - 2 S 8 - 2 S 8 - 2 S 8 - 3 S 8 - 2 S 8 - 3 S 8 - 5 S 8	0.55.0	' 1 1	H## 0 11111
CX. CX. CX. CX. CX. CX. CX. CX. CX. CX.	CPA CTENTS (WATE CPA CPA CPA CPA CPA CPA CPA CPA CPA CPA	COEFFICIENTS BASING CNFA CNFA CNFA CNFA CNFA CNFA CNFA CNFA				'	200
CA - CAZ CAA - 1167 1197 1197 1197 1198 1198 1198 1198 119	1	77	CNP45 -478-938 -478-938 -486-156 -451-831		- :	i	2 5 6 6 6
1117 2.386 1.637 1118 2.816 1.657 1119 2.316 1.657 1119 2.316 1.657 1119 2.316 1.657 1119 2.316 1.657 1119 2.316 1.657 1119 2.316 1.657 1119 2.317 1119 2.	;	~ ~	-578.938 -578.538 -696.156 -636.803	1		- 1	2 5 5 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
115 2.874 1.657 1.	:	î	-886.156 -626.903 -451.831	1		1	C &
1106 33.98 11.755 1165 33.751 1.755 1244 4.682 5.115 1245 4.682 5.115 125 5.121 5.155 125 5.121 5.155 125 5.121 5.155 125 5.121 5.155 126 5.155 127 5.155 1			-636.803 -451.831				
185 3.751 1.866 384 4.6216 5.011 344 4.6216 5.011 320 5.710 5.145 310 5.151 5.145 271 6.022 2.597 271 8.492 2.597 271 271 271 271 271 271 271 271 271 271			-451.831			-12,303	
244 4.662 2.114 244 5.662 2.116 326 5.717 2.245 326 5.717 2.245 327 4.553 2.457 271 4.022 2.457 271 2.452 2.457 212 2.452 2.457 213 2.452 2.457 214 2.452 2.457 215 2.452 2.457 216 2.454 2.457 216 2.454 2.457 217 2.452 2.457							· •
1944 4.682 2.116 1949 5.200 1928 5.11 2.245 1959 4.553 2.59 1951 4.62 2.59 1962 2.69 1962 2.69 1962 2.69			-323.563		3.934 .753		
286 5.717 5.263 296 4.553 5.47 297 4.653 5.497 251 3.492 5.591 251 3.492 5.591 251 3.492 5.497 262 2.891 2.60 2.380 2.770 2.60 2.380 2.770			-178,691				Ļ
230 5.11 5.151 231 5.151 5.151 235 4.551 5.47 251 3.492 2.591 251 2.492 2.591 200 2.380 2.770 150 1.962 2.670		i	-114.403	i	7647	1	010
295. 4,553. 2,475. 251. 3,495. 2,597.	1.701	798° d + 65°	-51-116		4.040	-21.365	
271 4.022 2.597 251 2.492 2.598 212 2.821 2.637 200 2.380 2.770 2.62 1.962 2.670			707° 15-				ر u • ا
251 3.492 2.659 215 2.811 2.1937 200 2.380 2.770 140 1.542 2.670			-35.559				-, 621
215 2.811 2.837 -200 2.380 2.770 -162 1.962 2.670	0.084850	. £ 1 £ . 67 R	-23.261		4.040 .677	2.170	1 - (
.200 2.380 2.770 -162 1.962 2.670			-14.003		4.046 .677	-22-170	0.00
1462 1.962 2.670		4,822	4.754	2,593 4.		-22.170	7.0
140 1.544 2.57			457.4-		4.046 .677	-22.176	I P
		.635 4.222	+ 32 + 4-		4.040 .677	-22.170	٠
	!			:	1		

# BEST AVAILABLE COPY

Table B-16 105mm M548E1 (RA on, launch)

		AIR CENSITY SLUGS/FITT	i i	ć		4 les											  			,		
	#C02 LEAGTH .420	AIR SLUG		0	16.6-	-5-976	-12,30	90 4	-17.925	-19.476	-21.054	-22.17.	-22.170	-22.170	-22-170	-22-170	-42.170		1			
	v.	76. PE MATURE DE G-F 59.000		EL CAPATS 1						İ						.617	£73.		 			
	NOSE FADILS 18-618			51300	60 e	9.5	3.946	3.93	3.970	3.95	40.4	4.046	4.040	4.046	7	200	0.0			•		
	0 0 0 0	GUN-ECFE INCHES 4.125	· (0/2/1)	CPF(11)	Z.E21	200.00	14.130	3.648	2.786		3.546	3.556	3.565	72.5	7 0	, ,	655.6					
	BANC Ulametro I.ols	45TLAt 7.15.1 CAL/TUSh 14.000	AEROCYNAMIC CCFFICIENTS ILATE COFFICT; TS EASFC ON LATE		4678,679	-886-156	LON-02-1-	-323.663		-114.97				14,000	456.41	4.77.4	457.4-	:				
_	bEPLAT Diameter .132	ACTUAL CAL)	TS EAS	(AFA3	101.644 101.644	92,366	56.533	34.116	21.619	10.717	5 4 J & K	7.534	7.006	200	4.272	4 + 2 2 2	4.222					
A LAUNCE	10	6th 14151 Crl/Turk 18.000	COFFFICE	CAFA	1.403	245	,	724.	725	576	263.	·605	0 q		63.5	635	•¢ 35	:				
105MM. MS4PF1178 LAUNCE)	C6 (FM NO°E1 3.280		nte trate	CYPA	050.	15.00	-1.256	151-1-	- 1-0-1-	058.	058*-		0 0 0 0 0	258	058	850	05P*-					
10544	TA11. Th 54 :	METGHT LBS 28,530	CCZFF ICIE	(P)	1912	.540	.787	1.165	1.476	1.561	1.701	1.96.1	30C • (2	5.25.5	2.297	2.26e	2.5.5					
	FCAT TAIL LENGTE	98-	DE YA AM IC	4 4 7 6	3.823	4.11.7	4.547	4.0		2.866	000	20.5	3.556	2.5.16	2.122	207.5	7.06.7					
	ACSE LENGTE 2.522	17 L2-17-5G 846.000	934	CAA	1,637	1.057	1.862	7.51	2 169	542-2	6.06.4	2.597	2.650	2.837	2.770	0.4.2		 	1		i	
		1x 1x-1x-5c 67,600	, i	CX2	2.386	3.367	3.751	6.683	5,203	5.710	10.0	4.028	3.482	2.93)	2.340					1 !!!!		
;	TCTAL LENGTH SAZ 19		! :		917	05[3	187	.246	345	000	952	672	-255	23.	[02:	i	.		-	-		
1	-	CIAMETER INCRES 4.125		.310	600	005	024.	1.050	10100	002-1	1.500	1.50	2.000	74.00	000	5.360						

Table B-17

# 105mm M548E1 (RA after burn-out)

					10566	M548E1(6F1CF	(an all					     		
		34.7	NUSE LFNGTH	PCAT TAIL LENGTH		CG (FW NOSE) 3.220	VEPLAT DIAMETER	PLAT METER 132	BANC CIAMETER 1.015	. EB	NOSE FADICS 18.618		BOOP LENGTH	
CIAMETER INCHES	ا م	1x 1x-56 56,000	14 1000-10-20 1000-10-20	: 1	4.816HT 4.85 27.500	1	GIN TWIST CAL/TUMN 18.000	ACTUAL TWIS CAL/TUEN 18.000	14.15.1 CFA 000	GUN-ECFF INCPES 4.125		EMPERATURE DEG-F 59.000	AIR DENSITY SLUGS/FT++3 .00238	38
			PERO	AEROLYNAMIC CCE	CCEFFILIENTS	2T64)	COEFFICIENTS BASEC	ATS BASE	C CN PATE	(V5/3) #				
	;	•	ž	2	G P	CYPA	CNFA	CAPA3	CNPAS	(111)	CPFISI	CNP4153	CHO	1
200	17	2.386	1.637	3,75	926	058	355	101.644	816.919	4	3.85	 	-11.190	0
600	118	2.388	1=£37	3,175	33	058-	- 255	1010000	1996 1996	3.006	3.946	.647	-11.190	-,033
308.	121.	2.874	1.657	710.7		700	500	67.430	-536-803	3.130	3-944	120	-13.486	9 20°-
2005	140	. 3.3E?	50/97	- KOC41	7 6	-1.256	.376	52.533	168.164-	2,521	3.964		-15.845	
056.	1911	4.234	2001	4.213	1.125	-1-15)		36.116	-323.6¢3	9	4.00		17.05	10
050-1		199	2.116	3.81	1.400	1 1 . 047	, r.e.	21-619	159-8-1-	200	1.50	767	-20.630	- 022
1.100	2474	5,207	20165	3-783	1.476	4.64		2,00	27.9	1.527	040		-22.218	5 u =
1.00	.330	5.710	7 4 1/2 4 1/2	3.731	1.561	0 0 0 0	C 4 4		-51.116	3.546	4.040	.730	-22,337	7
1,350	- 212	-5.151	2.363	  	100	5 to 3		3 C C	-41.837	3.554	0.50.5	.730	-22.854	- 02
1.500	362.	4.59	4 7 7	r (			4	700	935.55	3,565	040*5	730	-22.864	ارة ا
1.750	- 272	4.026	2.597	7.7.	7 0 0	1	677	6.078	-23.281	3.574	4.040	730	-22,854	
5.000	252	3.426	L 10 C		, u		36.9	5.150	-14.003	1.584	4.040	. 730	-22.854	9
2.500	1221	7-4-7	7	1 2 2	202	0.50	1	4.222	-4.724	265*6	0 7 0 * 7	.730	-55.854	\$ 1 · ·
3.000	162.	2.380		0.00	346	- T	4	4.222	437.4-	1,593	0.40		-22.854	֓֞֞֜֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֟֓֓֓֓֟֟֓֓֓֓֟֓֓֓֟֓֓֓֟
4-600	163	225.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	F 534	200	054	α. Ψ.	4.622	457.4-	3,593	4.040	.730	-22.864	
90005	1.1.		) 									i	1.	
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			;											
	:													

Table B-18

### 155mm M107 (HE)

	HCAT TAIL	93	4 10 48	14	PAN		A D C A		MOCH	
  -  -	,	15k masel	- DIA-FIER 090	и тен 1090	DIAS.11.0	0	PADILS 10,747		LENGIH 3.600	
	1451 48	F. 7 4 5.	<u>.</u>	ACT 14 125		7 JUNE 4:17	07.5	30.174030437		
7 - KI - G -	7.7	47 17 17 17	1	1 1 1	2 2 2	2000		3 40 4 4 5	ALL OF THE PARTY O	7117
-4311-000	300-55	:	000	20.020	a	£1,075		59.200	• 00 - 38	38
AFFOCYNAMIC		CCEFFICIENTS (MATE CLEFFICIENTS PASED ON MATE . (DZZV))	EFFICIL	VT: PASEC	CA PATE	* (D/2V))				
Q.N.D	CMB CFA	CTWA	( A = A	0.4047	CAPAS	( bt 11)	151547	( 5 / 4 G. 7	OR C	a S
1.766	-361.06?	i ~1	1444	564653 - 6434027	530.065	Zeze1	316	410	•	ن ا ا
1.746	_			80.053 -8	-843.527	2.2P1	3.318	.264	3-1-6-	0.0
184	į	į	i	86.040-7.752.600	7£2.66.0	01805	34945	- 136	-5,146	- 0 ZB
	•		- : [4]	56.395 -546.453	546.453	2.803	3.419	.382	-7.468	054
	1		-046-	4- 824-54	20-752	3.512	355.	458	-9.902	021.
	-	564.	25.		-275.013	3.134	3.450	797.	-13.942	-,026
	* *	į			~ 149.347.	1	3.44.5	4.15	-13,354	020
	7 5 5 1 L 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		- :		0000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7000	3.456	.423	-14.634	510.
2.445	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	937	, ,	1	- 24 - 24 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	1	3,506	505	25.836	910.
582	-		7 7		710.05	7.07	יי פיי פיי	900	707.51	J (
0.54.2	_		.351	- 219-4	-22,575	169	3.504	30,	15.463	9 0
- 111:	1	!	376	-	×14.632	4	1,506	4	-15.463	910
2 558*2	_		-365		-6.569	3.445	3.506	604.	-15.463	210
1			- 373	3.605	1.453	2,453	3.506	909	-15.443	2.016
2 127.2	- <b>∓</b> .		47	3.675	1,453	رام الأرام الأرام	3.506	÷04.	-15.463	016
000	505		777	203-1	1553	3-455	3.50£	604	-15.461	\$10-

Table B-19 155mm M110 (WF)

	TC1AL LEAG1h 4,524		NOCE LENGT	NGGE LENGIE Z.u44	F. I TAIL	11	CG LF# NGSE1 2.970		MENLAT DIAMETER + 090	GANC LIANETER 1.016	:	405E 2010s 10°747	0	ECO# LENGTH 0.000	
27.744	0	1		1	i   		Y   S			18141	GUN-ECHE		IE~PERATURE	A IP DE	DENSITY
INCHE C	!	- 41-94	960	L3-11-5G	99.	5.6.10C	C 6 L	C&L/TL#N 20+000	C&L/TLEN 20.000	000 157	14C+ES 6.052		066-F -59,000	SLUGS/FT**7	338
	İ	i		0 5 J Ø	) DIMONADI	CEFFICIEN	AFFOCTA AMIC CCEFFICIENTS WATF COEFFICIENTS EASEL ON WATE	COEFF ICTE	NTS BASE	C CN HATE	(10/2/1)		1	:	1
1	5		CKZ	a V	CPA	  &	1d/2	CAFA	CNFA3	CAPAS	CPFill	CPF(5)	CNPAIS)	CHO	3,0
4			2.36.5	1.766	3.361	1.067	7.68	525	25.00	730.57	[ 0.7.0	3.3	267	5.207	20.0
000	•		2.368	1.786	1, 16;	7.46	200	330	80.010		02.4.2	3.412	600	5.207	970
005	951,		3.377	1.633	026.5	5 E A 4	ۍ تا ت	441	50.345	-546.453	503+5	3.419	3.86	-7.527	47.0
4			7	50.35	3.952	5000	-344-	-04E	45.E29	7 87 025	عَالَ عَدِّ	356	27,0	130.00	- 000
1.000	255		4.186	5.151	5. 10.00 10.	1.262	50 5 T	.16:	31.251	-675.013	3 0	0.74	1 1	VIII.	0.20
ф.;		ļ	1 2744		1000	2014 714	7 J 1 J 1 J	\$0.2°	12.155		127	3.466	1.75	-14.491	510-
	950		727	0.00	, d	4 4 4	1.75.8	325	5.635	154.845	0,000	3,506	-412	-15.852	519*
			5.75	1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 C)	1.567	-,768	58.6	1.624	-38.760	3.412	3.506	415	-15.748	- 15 015
			3	296	504.6	- 423:	768	342	-624-3	-20-717	1.421	3.506		059-51-	419
1.750			3.486	5.690	3,232	1.768	- 76 B	*354	6.017	-22-675	16,401	3,000		15.140	2 6
2.000		1	- 15mg	2-174	3.105	758°	1 t t	197	512.5	VI 0	200	900		000	
2.500	•		. 75.	(L)	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	O 0 0 0 0	10 14 15 16 16 16 16 16 16 16 16 16 16 16 16 16	107.	7 U	, co	1 4	, c	21.7	19.4	9.0
			, .	100	100	000	1 4 7 F	175	100	1.453	1 di	3.506	412	15.450	0]
900	202.		- v.	3 C	2.66.2	1.965	7+ 8	3.55	3-6.05	1.453	1,455	30505	5140	15,490	015

Table B-20 155mm M110 (Gas)

		6.052   16.05644   16.052   55.06   16.052   55.06   16.052   55.06   16.052   55.06   16.052   56.05   16.0	CLAN-12 CALLAL-12 CALLAL-12 CALLAL-12 CALLAL-12 CALLAL-13 CALLAL-1	64. Lalel 1 C. C. Lalel 1 C. C. Lalel 1 C. C. Lalel 1 C. C. C. Lalel 1 C. C. C. C. C. C. C. C. C. C. C. C. C. C	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CCFF 10	000 000 000 000 000 000 000 000 000 00	A 2 2 4 4 2 4 4 2 4 4 4 4 4 4 4 4 4 4 4	CX6 CX6 CX6 CX6 CX6 CX6 CX6 CX6 CX6 CX6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Californ   Californ	CACTURE CONTRACTOR CONTRACTOR CONTRACTOR CALVILLY INCRES  CACTURE CONTRACTOR CONTRACTOR CONTRACTOR CALVILLY PROPERTY CONTRACTOR CONT	- 10.72   10.00   10.0	20.45 20.45	20000 200000 200000 20000 20000 20000 20000 20000 20000 20000 20000 20000 20000 200000 20000 20000 20000 20000 20000 20000 20000 20000 20000 200000 20	000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CCFF   CC	0000 0000 0000 0000 0000 0000 0000 0000 0000	A 2 C C A A C C C C C C C C C C C C C C	Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx C	LB   LB     LB	1 . ' 1 ' !
##FORLYAMIC COFFICIENTS (=015 COFFICIENTS EASEF CN walt = 19729)]  ##FORLYAMIC COFFICIENTS (=015 COFFICIENTS EASEF CN walt = 19729)]  ##FORLYAMIC COFFICIENTS (=015 CNEM CNEM CNEM CNEM CNEM CNEM CNEM CNEM	Care   Care	6.052 - 55.0 - (57.8) - 6.22 - 55.0 - (5.28) - 3.318 - 5.22 - 5.23 - 5	200 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20.00 COLFT IIC	CIENTS (F. 17.7) CVT.	CCFF 10 C CFF 10 C CFF 10 C CFF 10 C CFF 10 C CFF 10 CFF 1	0000	AFE. 1.754 1	C X C X C X C X C X C X C X C X C X C X	44   44	i v
CX CX CXA CWA CVPA CNFR (CNFR[C]ENTC EDSET CN HATE = 19/2V)  CX CXA CWA CVPA CNFR (CNFR C] 2 C C C C C C C C C C C C C C C C C	CN CXE CNA CNA CNA CNA CNA CNA CNA CNA CNA CNA	6 (9/24)]  6 (9/24)]  6 (6 (1)   CP (5)    6 (6 (1)   CP (5)    6 (6 (1)   CP (5)    7 (1)   3 (3)    7 (1)		44.00 4.10 4.10 4.10 4.10 4.10 4.10 4.10	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CCFF1C	00.48.48.10 Cent. 30.69.49.69.96.99.96.99.96.99.96.99.96.99.96.99.96.99.96.99.96.99.96.99.96.99.99	COA 1.266 1.	.   ! !	1 8500	**************************************
CX CX CX CX CX CX CX CX CX CX CX CX CX C	140   2.156   1.754   1.067   1.754   1.555   1.544   1.554	CKPAS (FF[1] CPF[5] C -e43.027	######################################			} : 7	3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	CAA 1.266 1.266 1.266	CX. -2.366 2.366 -2.864 3.377	4 5 7 7	4000 0000 0000 0000
140	140   2.16   1.764   1.404   1.404   1.505   1.603   1.603   1.604		866.053 80.043 80.040 81.045 81.041 13.155		1	-	3.44.44 3.44.34 3.45.4 3.47.5 5.47.5	1.764	2.366 2.366 2.864 3.377	4500	0.50
19   2   3   4   5   4   5   4   5   4   5   4   5   5	194   2016   1244   2434   1644   1444   1	- 542 30 27 2 2 2 3 3 3 3 3 4 4 5 4 5 4 5 5 5 5 5 5 5 5 5	20.033 21.345 31.634 31.631		1		3.436	1.24	2.366 2.864 3.377		-600 -600 -500
154   3.377   1.077   3.621	154   1744   1	25.4.2.2.2.2.2.4.2.2.2.2.2.2.2.2.2.2.2.2	#0.010 #1.345 #1.651 #1.6651	•	1	1	3.634	1.00.	3.377		
154   1377   1.073   3.975   4.75	154   1377   1   1973   3.575   3.57	-275.013 3.134 3.45 -275.013 3.134 3.45 -145.347 3.255 3.445 -145.347 3.255 3.464 -54.053 3.254 3.466 -24.053 3.353 3.466 -27.76 3.412 3.506 -27.77 3.431 3.506	31.651 11.651 12.665	'	1	٦	3.475	ינים יו	3.377	•155	005.
1.5   1.6	13   13   13   13   13   13   13   13	1.134 1.2555 1.2555 1.2555 1.2555 1.2556 1.2	11.531 14.685 13.155				-				
1906   1907   1908	10   10   10   10   10   10   10   10	-145.347 3.255 3.445 -5.445 -5.254 3.466 -5.445 -3.254 3.466 -5.477 3.453 -5.556 -5.453 3.506 -5.25475 3.433 3.506	17.685				ſ	2 151	*31.	<u> </u>	 
18-26   18-26   18-17   12-155   5-44-165   13-24   18-26	1910   51152   6274   2.606   1.417  e44   .274   12.155   54.163   3.124     1910   51152   6274   2.606   1.443  774   .314   7.675   -34.445   .315     1946   5.154   6.465   1.475   1.475   .324   6.22   -30.117   3.121     1946   5.154   6.475   1.455   1.455   .324   6.406   -6.555   3.445     1946   5.154   6.475   1.455   1.455   3.445     1946   5.154   6.406   -6.406   -6.406   -6.406     1946   5.154   6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.406   -6.406   -6.406   -6.406   -6.406   -6.406     1946   6.406   -6.	-94.053 3.224 -54.845 3.753 -24.760 3.412 -20.71 321	_				, (*	- 19 - 19 - 19 - 19 - 19	124	3000	0000
	154   54644   5754   7445   7445   7445   7475	-54.845 3.752 -38.760 3.412 -30.117 3.421 -22.675 3.431					۰, ۳	52.00	5.15	0 60 5	201
154   154	1564   5.124   5.455   1.577   1.577   1.578	-34.760 3.412 -30.717 3.23 -22.475 3.431				1	1	44	4	2	001.
135 4,15; 2,58; 3,445 1,650 - 20; 1,412 - 10,11 1,112 - 10,11 1,112 1,11	135 4,552 2,582 3,485 1,658 320 1,218 22,182 3,0411 3,127 3,18 3,18 3,18 3,18 3,18 3,18 3,18 3,18	-22.475 3.431				_	3.535	2.4.5	5.164	.5	1.350
-316 3.926 2.650 3.313 1.728724 3.31 1.328 3.306 3.506 3.	-316 3.926 2.650 3.33 1.778779 3.31 6.017 -52.675 3.493	16*** 614.22						2.58	4 56	45	
							2.313	2.690	3.9€€	.216	1.50
. 26.3 2.75; 2.85¢ 2.75; 1.98¢784184 4.409 -8.55¢ 3.495 3.50¢ 3.5	.263 2.79; 2.857 2.752 1.582784336 4.409 -6.5832.489 .269 2.359 2.750 2.75048348532.455 .202 1.867 2.750 2.7504854356 3.605 1.4533.455 .202 1.867 2.750 2.750 1.505378376 3.605 1.4533.455	144 - 75 0 - 75 0 - 71 0 - 71 0 - 71 - 71 0 - 71 - 71 0 - 71 - 71	į			٠	34146 -	4.774	- 45446	56:	-5400
		WAR					3.44.5	2.5.5	2.75.	.263	20.500
- 202 1987 2.15G 2.15G - 15G - 15G 2.15G 14G 3 3-4G 3 3-5G 3-3G 3-15-289	. 202 1.897 2.750 2.755 1.955747 1.35: 3.605 1.453 1.453			:	•	į		454.	2.350	047	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2.545 1.555 1	1.453 2.455					2.15.6	2.150	1.857		000
		1.453 1.455	3020		١		7	3	1	4	9

Table B-21

## 155mm M115 (wht smoke)

	TCTAL	-	ACSE CACTA	GCAT TA!	11	0.0 0.00 % 7	3 C	WEPLAT DIAMFIFR	BANC	au	P.OSE FADILS		ECON LEAGTH	
	725.7	2	2.444	***	1	0 0 0 0	:	060	1.016	9	10,747	0	000	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		, ,	<u>.</u>		16F1	91.5	6LN 11151	ACTUAL THIST	12141	SUN-ECKE	TEND	ERATI, RE	AIR DENSITY	YLIS
1ACEF 9		15-41-03	190-145	35	300°55	C1L	C11/1648	C4L/114h	000 - CO	INCHES	6	06.6-F 59.000	SLUGS/FT* ,00238	T#33 38
			Q = 1	) I a q v	CCEFFICIENTS (-ATF COEFFICIENTS EASED	Tc ( 0 TF	CUEFFICI	ENTS EASE	C CN DATE	* (C/24)3	1	!		
	,	,				43.7	1000	C A G A 2	24045	113.43	CPF161	1808151	0.80	ا د
1 6	, , ,	2 c	176	4.4	2 4 C 4 C	1 / E	() () () () ()	80.00	-843.027	201	, c	544	-4.750	0.04-
36.5	071.	2.3t f	1.76	) P1	1.054	1. 1. F. H.			.842.027	1000	3.1.P	445.	051.4~	030
0		η		3.631	- 4964				-764.600	£2470 .	3-418	316	-4.750	- 028
005.	155	7.5.5	ر الرام الرام الرام	3.976	2000	1 - 1 - 2 1 - 2 1	7.7.	1000 and	-546.453	7.503	7 4 5 C	0007	19.522	024
1000	125	196	7.15.	1 4 R 4 L	E 12.	1,57	133	31.251	5:5-0:3	2,134	3.420	1	-13.463	020
9	33.5	4.67	- 56.63	3.40.6.	- 1.365	サコア・・	.234	10.00	-145-347	2.25	3.445		-13.020	020
1.100	2	5.152	512.5	3.00	1.417	プリル・1	4.5.	13.155	-54.053	1.324	3.466		-14,262	510*-
4.504	425	2.654	2+35c ·	.3.655	1.444	168	305	5.235	3 9 8 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	56575	3.504	- 1	-15-475	213
0,070		5,124	1.01 1.01 1.01 1.01	2.5.4 5.14	1.567	54/	37.6	1.626	-36.753	3.423	3,506	389	15.289	7.00
1.75	-316	3.56	254.5	3.313	1.75.1	71.0	.331	F. r.17	-22.675	154.5	3.50¢		-15.289	01e
2.000			- 2,772	3-188	- FB - FB - FB - FB - FB - FB - FB - FB	762	യും ന ന -	_ 5.213	-14-632	3,3	1,506	- 1	1.5 2.5 V	0 0 0 1
2.500		2,75	1.00 0.00 0.00 0.00	5.95.5	10 C	7. I	4 7 4 . 1.	4 0	- u - v - v - v - v - v - v - v - v - v	ار اع تر ا	3,00¢		- 15.0 PBG	9 6
500	1000		750	7.75		7.50	1	(C)	1.453	!     	3.506	369	-15.289	316
000	180		2.650	25.2	1365	- 14 E	1	20405	£2, T		3,506	4383	-15,289	-016
					;		!							
					!		:		1					
	         				!	:		:	!	1				
									:					
				1	1		:							

Table B-22

155mm M116 (cIrd smoke)

2. 386 1.2 2.3 2.2 2.3 2.5 2.3 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5	000	11	115 ED 251 00 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	9	0.000	TAPE LER	i : !			F F F C F F	
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	100 × 000;	1001. 1005. 1005. 1005. 1005.	E4.5 C - 1 / Ft			, , , , , , , , , , , , , , , , , , ,		10.747	0	0.030	Ìi
447.000 40 447.000 40 140. 2.386 1.7 140. 2	.000 .000 .000	LHS E6.40C	0 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		ACTUAL TAIST		6UN - E 0 F F	16 w P E	TEWPEPATUPE	AIR DENSITY	=
CA CA CA CA CA CA CA CA CA CA CA CA CA C	FOE NAMIC CO	EC.40C	1 0 0	•	CALITUME	4 5	INCHES	90	DEG-F	SUUGS	• •
7. 140 2.386 1.7 140 2.386 1.7 140 2.386 1.7 140 2.386 1.7 140 2.386 1.7 140 2.386 1.7 150 3.386 1.7 150 3.386 1.7 150 3.386 2.1 150 3.1 150 3.386 2.1 150 3.386 2.1 150 3.386 2.1 150 3.386 2.1 150 3.1	FOE NAWIC CU	FF ICLENT		000	20.000		- 250	} <u>-</u>	300 - 5	96.500	20
CA CA CA CA CA CA CA CA CA CA CA CA CA C			S CHATE COM	FFECTER	TS PASE!	C. FATE	* (E72V))		 		ļ
140 2.368 140 2.368 154 3.377 2.36 4.164 2.36 4.164 2.36 4.164 2.36 4.167 2.3		ú	0,440	CAPA	:	CAPAS	111390	CPF ( 5 )	CNFA(5)	0,0	
140 2.386 146 3.377 116 3.377 120 4.187 130 5.157 130 5.		1.067	٠.	255.		- 543.027 -	- 2.68)	3, 118	44	-4-50	033
2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2		1.154		12,00		190°65a-	Z • Z • Z	3,318	***	007.4-	200
2.56		-5¢7				-762-500	- 204.00	3.5		7 80 7	200
200 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		() () () () X ()		1	100	1040.400	5000	7.10	000	10.522	70.
200 - 100 -	3.000	2001	- 77-1	1 -		-275-013	10.5	0.54.5		-13.463	020-
200 200 200 200 200 200 200 200 200 200		35.0	\$ · · · · · · · · · · · · · · · · · · ·	7.2		-145.347	3.25.5	30445	- 1	-13.020	1
254 5.164 254 5.164 254 5.164 316 3.495 316 3.463 2.753		1 - 4 1 7	7.00.1	275.		-54.053	3.324	3.466	004.	- 4.262	510
2016 2017 2017 2017 2017 2017 2017 2017 2017	į	£ 40 m F	1.144	36.ĕ	56.54.5	-54.845	1 23 1	-3.50£ -	1	-15.475	ì
3.996 3.996 285. 3.996 263 2.793		275	T .	<u>.</u>	7.624	-38.760			7 0 0 0 C	15.408	70
		1 2 2	100	427	4.17	125.65	2-431	3.506	1	15.799	1
292 292		. Ji	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 2 1 1 1 1 1	5.213	-1.4632	2,140	3.506	i	-15.289	1
, , , , , , , , ,		17.7.	20 42.	) (1) (1) (1)	7:00 T	-6.589	3.449	3,506		-15.269	017
- 356 - 5 4 3 Et -		4.026	341	385	3-605	1.54.5.	254.55	3.504	195	-15-285	910
1959		1.955	7tB	252	3.6.15	1.453	4.69	506	369	-15.284	016
- 5,000 - 180 2,425 - 5,650		333	244	بزر	cm a		1	July	1	CB. ACT.	1

Table B-23 135mm M121, M121A1 (chemical)

	TCTAL	¥3,	HOSE	FOAT TAIL		CG LFM NOSE	#€ • D1A	#EPLAT Diameter .090	BANC DIAMETER 1.016		RADIUS 10.747	- - - - -	LENGTH 0.000	
	#3= <b>6</b>	,												
C. LAME TER		TX.	7.		LEIGHT	<b>10</b>	GUN TWIST	LACTUAL TRIST	TEIST	GUN-BORE	i	TEMPERATURE Degar	AIR CENSITY	SITY
INCHES	9 3	515-000 515-000	LB-TN-50 A643.000	     <u> </u>	299.700		20.000	207	20.000	6.092	!	29.000	•00238	38
		     	AEROL	PHANIC	AERODYNAMIC COEFFICIENTS (RATE		COEFF 1C1	ENTS BASI	COEFFICIENTS BASED ON RATE	* (D/24)		ı		
1 4 2	- 3	51.0	4.80		, đ	CYPA	CNPA	CNPA3	CNPAS	CPF(1)	CPF (5)	CNPA(5)	Ckg.	. CLP
	1,	- 20.366	1.266	3,260	1.067	768	532	88.053		.2.281	3,318	1924	-5.146	-030
909		2.308	1.766	3.350	1.054	768	532	88.053		2.281	0.40°C	300	-5-146	000
808	24	3.864	1.786	3-585	2967	768	187	80.01	2,62.600	76970	2446	200	7.46	020
006	156	3.377	1.833	3.927	2632	, CO.	1	46.870	-620-797	3.012	3,356	4.00	206	120
928	122	44.14	2.151	9 6	1.203	500	150	31.251	-275.013	3.134	3.420	744	-13.841	- 020
9 9	2364	4.672	2.232	3.582	1.369	406	*25e	18.685	•	3,259	3.445	4430	-13-334	050
000	380	5.192	2.279	3.548	1.417	859	.301	13.155		3,324	3.466	.423	-14.634	5.0
1.200	17	5.694	2,350	3.597	1.443	299	325	9.235	- 1	3,293	3.506	400	-15.836	610
1-350	,354	5.124	2.465	3.468	1.567	768	.336	7.626		3.4.12	3.506	607	-15.702	\$10°
1.500	4339	4.552	2.532	3.418	1.650	768	446.4	228.9	17.000-	1.46	900	1	15.463	1 C
1.750	.314	3,986	2.690	3.243	1.768	907.	165.	10.0		7 4	200	004	-15.463	
2-000	-295	3.451	2,172	3-116	1.850	007	000	714		7	40.00	604	-15-463	- 017
2.500	.263	2.47	7. O. O. O. O. O. O. O. O. O. O. O. O. O.	7.07 C	706.0	9.46		2,605		957	3.506	409	-15.463	016
3-000	200	100	25.0	2 683	000	74.	12.5	3.645	ì	3.459	3.506	604.	-15.463	016
000.	707	1007	0.00	1 2 4 7	596-1	768	.373	3.603	1.453	3,459	3,506	604.	-15,463	016
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Table B-24

155mm M485E1, M485E2 (illum)

In	ACIUAL LAIST GUS EURE CALZIU-N INCHES 20.000 6.052	JEUPERATURE AIR CENSITY
CA CXE CAA COO CAA CAA CAA CAA CAA CAA CAA CAA	<u>£.</u>	
Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx C		
CX CX CX CX CX CX CX CX CX CX CX CX CX C	TS BASEC CN HATE " (D/24))	
132	CNPAS CPF(1)	1 CNPA(5)
132   2.334   1.731   3.736   1.732   -7.72   -3.34   7.72   7.72   1.	01:42 : E32:140:1	3.340 .318 -6.022
154   2.845   1.545   2.655   724   1.675   2.631   4.625   1.545   2.631   4.625   1.545   2.631   4.625   1.545   2.631   4.625   1.545   2.631   1.675   2.631   2.635   1.645   2.635   2.645	-761,533 2-457	167.
100   100	-545.673 2.624	4. E. C. A.
	-42041/3 3465	-14.515
13.13	-149,033 34277 -	468
375 5.14c	193+H73 3+543	.480 -15.180
194   5.067   2.456   3.677   1.56  772   391   7.615   392   7.615   392   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615   393   7.615	-54.717 .3.415 -	E94 9
33 6.50 5.57 3.51 6.44	139,653 3,434	3,528 ,463 ,15,916
310 3,941 2,682 3,035 1,797 -,772 4,612 5,009 -, 25 2,099 -, 25 2,099 -, 25 2,099 -, 25 2,099 -, 25 2,099 -, 25 2,099 -, 25 2,099 -, 27 2,	-30.621	44
255 2.756 2.819 3.873 3.772 3.593 3.599 3.	107.00 VOV. 100.00	3.528 4463 15.314
255 2.751 2.885 2.01c 2.003 -7.72 4.22 -7.293. 	56.55	.463
196 1.947 2.735 2.486 2.050772 .427 3.599	1.507 3.481	463
10 10 10 10 10 10 10 10 10 10 10 10 10 1	1,507 3,481	3.528 .463 -15.314
137 1420 2 420 2 424 1950 1722 4627 3 599	1.567 3.481	1

Table B-25 155mm M449E1 (ICM)

	1010L 16MCTH - 4.51P	25%	1, 14, 15, 15, 15, 15, 15, 15, 15, 15, 15, 15	FCAL TALL		Cr. 1FW h0se) 2.992	19. 10.	DIAMETCH	HANC DIAMETER 1.016	a.	224.11 2. H40165	3	6.00k 6.000	
	•	:	!	:	1.4914	. 4.19	GIN 14151	ACTUAL TRIST		GUN - ECRE	150	TEMPERATURE	AIR DENSITY	117
1AC+69 1AC+69 6-1169	10- 479	475.660	25-VI-41	0.0	7		C)L/TU-N 20.000.	Cal/1148	7.7 000	INCHES 6,095		DE 6-F 59.000	\$LUGS/FT*47 *00239	39
			- : - : 0 # 4 & C.	באר שאונ ככ	LFF ICIFI	ARECEVABLE CERFICIENTS INSTR CORFICIENTS EASEE ON	OFFICIE	TS EASE	Ch HATE	( (VS/1)		; !		
1 0 0 0	5	273	0 \ 0	1 20	49.0	611.0	CAFA	CNFA3	CNPAS	CPF(1)	(PF (5.1	CNPA(S)	CHO	373
010	• 136	2 . 3 . 3 . 5 . 5 . 5 . 5 . 5 . 5 . 5 . 5	1.731	3.36.5	341.4	772	-,546	87.535	- F41 - 853	210	0,00	6924	5.040	0 0
004.	132	2.334	1.731	13.5	1.132	571	1 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	27.035	- F4] - 853	2007	3.340	146	10.040	1000
000	\$ 10 de .	10 C	1.75.	4 0 0 0 0 0 0 0 0 0	) T -	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	725.		-545-573	423.0	900	384	-7,308	40.0
000	• 10 - 4 6	5 4 5 6 5 10 5 6	2005	7.00.5		72011-	250		-420-173	3.626	3.40P	-453	9.70)	1274-
0110	31.	24.44	251-2	2.7.54	1.517	T 7.7.	-1:7		-274-593	3.149	3.435	-44.2	-13.578	-, 320
	/ T. P.	1.20	5 - C	3.5%	1.361	7:7:1	562-		-149-053	7	3.466		13.055.	070
1.100	٠,٧٠٠	5.140	592.2	315.5	1.443	245.1	(1) (1) (1) (1)	13.137	-43.873	C 7 C C	3 4 4 E		172.41.	r (
, i. i.	446	5.4.3		5.5.5	7 44 7	77	327	5.55	-54.737	3 6 3 6	יין מיין מיין	614	15.170	
	2 3 (1)	5.067	a ::	7.	4.6	2//-	77.	100	200.001	100	900	7 (1	0.4.4.	
	233	1	- 27 9 2	4	7.57	- 715	4.0	4.009	-22.589	3.453	3.528		-14.878	91
1,750	0 0	1 4 5 6	. u	200		7.7.	, p	200	-14-557	3.462	3.526	- 1	-14,878	-118
0000	* u	2 7 1	, J	) IV	2 0 C	-1.72	( C) (C)	4.403	-6.525	264.5	3.52e	_	-14.878	017
990	7 6 5	2 7.00	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	0.74	100	271		3-559.	135-1-	3.481	3,528	411	-14-878	116
000.4	195	2.1	200	1	2.020	176	.377	2,590	1.507	13.4.0.1	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	. 413	-14.878	71.
5,000		- 9494	<del>3695-</del> -	4	758	-772	377	- 985.E	1.567	38	1456		S)Bekl	
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Table B-26 155mm M449E2 (ICM)

	1Cial 4 FNCIP 4 - 519	NC 9 LFN G 1 F 2 5 L 5	56 505	FCAT TAIL LENGTA		CI- (FP-NUSE) 2-984	. E.	*EPLAT D(AMETER • 590	Clayeler 1.016	3. b	NOSE 	0	ECC* LEAGIH	
	-		2		1451	¥:		PCTCAL 3		GUN - ECKE	TENP	EHATURE	AIR CENSITY	SITY
	<u>ن</u>	N-65	1 P - 47 - 4.	ر.	ŞeJ	11.3	457: CT-0	CAL/ILPA	4,	INCRES		0EG-F	SLU65/F1**3	£
£ . 11.5 E	, 4 , 4,	445.000	3653.000	. 0	Se . 100	0.2	50.000	50°C00	000	560*9		29.000		88
			36 × 0C	ThamIC CC	EFFICIEN	SFLOCYNAWIC CCEFFICIENTS (METF C	.0EFF7.11	COEFFY, IENTS BASED ON MATE	C CN PATE	* (6/2V))	:			
1		13.5	940	OM B	: :	CYPB	CAFA	CNFA3	CAPAS	CPF (11)	CPF(5)	CNPALS	010	S.
0.01	- + 134	2.336	1.731	358.0	1.045	772	-556		-641,853	2,310	340	+275	-5-163	• 030
· enn	.136	2.336	1.73;	2.377	1.032	774	125		-641.853	010.0	12 94 G	2/2	-5.163	0 0
6.40	• 1 3 <del>c</del>	2.43	1.751		5.0	2//-	7		-161-533	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	954	165	15457-	124
	7 :	3.345	1 U	レー かり かり	600	TOT I			-426-173	3.026	3.408		-9.819	127
	1 -	1 - 1	133	2.777	1.217	1.358	.16'		-274.593	3.149	3.435		-13.695	0.50
050	. 7 -	-4.664	5 ( 2 + 2	3+534	1.36.1	7.5.1	+256	18.659	-149-053	3,277	3,466		-137.85	1,020
0.1.1	.275	5.140	2.269	154-1	1.44]	1 . I		13.137	-93.873	0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04	2. 2. 2. 3.		2/6-41-	\$ 1 T
1.500	4364	5.637	2 . 344	3.549	1.467	172	-333	5.22	-54.717	5 7° £	2.5		1.55	(1) (1)
1.350	- 0 * E	E . 067	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	17.	1.554	172		7.615	138,653	4 to 2	00 c	0 0 0	0/2-51-	5 6
		- 2060		1 y y y y y y y y y y y y y y y y y y y	707		36.	4.009	22.589	3.453	3.528	1	-14.932	016
	- U	1140	10 C	3.06	1.873	772	, 0 0 1	5.206	-14.557	2.462	3.52P _	.420	-14.932	- 0.1E
00.0	- J	7 - 2	0 4 5 10	7 (C)	200-2	772	.37	6.34.4	-6.525	3.472	3.528	,420	-14.932	015
900	 	7	9.00	-2+65C	1 50 + 2	= 172	2)	3.599	- 1.5C7 -	_184s1_	32526	- 1	-14.932	100
00.5	551	1.567	2.739	ري اور اور اور	6.050	17≥	r ei	3.599	1.507	3.481	3,528	.420	-14.932	016
		, , ,	1 (V	2.622	1.95	-1776		1.599	1.507	2.481	3.528	- 1	-14,932	-1016

Table B-27

## 155mm M483E1 (ICM)

		MOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTe-3 NOGS/FTE-3 NOGS/F
	LENG1H C.000	
		2 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	005E F401L¢ 5.478	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
		000 E C C C C C C C C C C C C C C C C C
	Clayelty 1.016	
	VI Pt A T Ci 3-5 IEH - 09+	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10000000000000000000000000000000000000
155884843611177	C6 1FM E0SE3 3,647	30 L
		102.00 103.00
	FCAT TAI	7 4444044444444444444444444444444444444
	1 + 4 + 5 + 5 + 6 + 6 + 6 + 6 + 6 + 6 + 6 + 6	11 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	ACCE4 FAG1F	11 - 17 - 17 - 17 - 17 - 17 - 17 - 17 -
	TC 7 aL + FP.C 1P. 5.ECD	411-42 411-42 4411-44 4411-
	+	10000 100000 100000 10000 10000 10000 10000 10000 10000 10000 10000 10000 1000

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Table B-28

## 155mm XM708E2 (HE)

	1C 1 A	1	الازواد	121 121		څا	1		J^vv ⊏	-	104E		1.CO1	
:	LIFACTE.	<u>ئ</u> :	LFNCTH	LEACTE		1971 - 1971	410	0.16 or 15 or 10.10	(10ME]EC.	<u>i a</u>	H 10 1 1 C C	ي د	Leve1+	
; ;	0.50		<u>.</u>	•		•	•			,		;	,	
CIAPFIEL.		X.	II		BF1CF1	4)6() 		1-120 100100	GUN-ECHE		TENPENATURE		ALM CENSITY	117
10C++ c . 6+092	*805 ···	000*805	000°0088	99		,		CaL/14 N 20.000	IACFES 6.09	CFE5 6*052	DE 6-F			
			7)-40	)) )[~"4.]	CFFF ICIF	0 11. 4 -1.	UFFF[(]E	BINGERWATE COFFICIENTS IN TO COFFICIENTS BASEL OF WATE * (622V))	/3) a 31#	(142				
1004	5	ì	9 40	1 6.7	143	91.5	1 1 1	CAPA3 CAPAC	CPF (11)	i	Ĭ	CAPACAL	ان ا	ن. :
013	•116	2.38€	1 - 1 - 1	4.063	, ,	5	, 44.				3.563	.452	-9.212	,
004.	-115	2.36.5	J 10.	110.4	-	יין ט	1				3.552	5.4	-9.212	
nog.	511.	2.k7t	1.605	4 • 34 (	7 4.	D P t	1/2	92.ch3 - 55.133	.,,		4.021	2.5	712.7-	•
ن ا ا		3,356		1 2 4 4 1		> [-	<u>-</u>	# 1	101		1.010	1: 4 7) 3	2014	
9 .	1		1 0 0	2 1 1 1	7 1 1	7	, , , , , , , , , , , , , , , , , , ,	コン・レール しょうりゃくしゅ コン・コン・コン・コン・コン・コン・コン・コン・コン・コン・コン・コン・コン・コ	<b>,</b> (-)		100.4	722	-17.631	• ;
	1 P.	1	15.7	7 7	54	-1.45	7		, , ,		J.04C	4657	-17.02	;
2	1 2 0	5.265	-71-2		1.1.1	-11	· , , ,	14.454 -117.753			4.062		-18.5AB	;
1000	, ,	5.11,7	3000	575.6	1.4.1	ا د د	353.				4.115	. 661	- 40.250	20.
1.35		5.150	24.5	7+7	1.775	, , , ,	J				4.115	4. 4 4. 4	1000	-
	\ \ \ 			1,000	77 C	0 4 n 1		733 . 6 1 15340	373 F COO			4		
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00:00	~~	1 1 1	14 14 14	4 7	5	, , ,	-				4.115	. 441	-5116	i
4.000	3	2.746	5.7.	7.00	11/5 - 5	υ Γ.	.615				4.115	_	-51.10	7
001.7	041.	1.563	3:4.7		1,1	ι τ 1	) I 4.				4.115	.64.1	-2110	ī .
6,0,3	1	- Falsk	3 5 5 6	داية المستر	١٠٠٤٠ ١٠٠	ų.	517.		373 4.665		4.115		-61.416	
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Table B-29 155mm XM708E3 (HE)

Color   Colo	11000 11000 11000	15	12-17-60	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	900	#£16EI L#9 \$£,000	Via (1.5)	1212 2	45 LEAL JEALS CAL/16-A 20.000		6.042	100	14 PE PATURE - 10 C C C C C C C C C C C C C C C C C C	SLUES/+ 7003 00/3H	~ C
(x) CA2 (b) Cwd (b) Cw				D. F.	D DINBARC C	CEFF ICTER		. OEFF 1C 11	ATY PASEE C	h # 6TE	(6/241)		}   		
1						143	447	477.0	F. A.A.D.	CAFAS	(11)	(5)3d0	ChPAIS	3 2	֖֖֖֖֖֖֖֓֞֞֞֝֞֞֝֞֝֞֞֝֞֞֝֓֞֝֞֝֞֝֓֞֝֞֝֞֝֓֞֝֞֝֞֝ ֖֖֓
	~⊅Cr	č	. Y C	4 ;	7 7 7	727	به او ا	714-	110.033-106	2.431	3.45	4.1.4	285	1.5.5.4	= -
11   2.455   1257  557  541  541  541  545	0.0.	<del>=</del>	55900	1.56	0 1	100	4	, ,	110.037-106	2.431	3.695	4.156	Se2	-12.6/4	
1, 2, 1, 2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	• € U.E.		554.2	ار ا ا	755		, ,		45 265 56	2.422	3.652	4.222	.e73	-12.674	1
1.627	E09.	E11.	(5) A	1.4%	**		7 4	i i	54- 600 - 5	5.573	1.60)	4.61:	546.	-15.048	0.0
124	205	2.)	3.504	1.637	- 715	- , .			62.0.0	3	3.	4414B	15.5	211379	177. 4
1	043	3.5	3.66	1246.	- #7.0 e	100	1000	-		1 1 1 1	315.5	4.201	402.	-21-139	9/
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	1.000	a 1.	4 . 3 . 3	4.12.4	1050	145.	577-	1 . 3 .	001 303 00	1 4	0.0	4.240	. 412	-20.541	024
10   10   10   10   10   10   10   10		1 2 4	4,04.4	C	4.67.9	7	> ( * ) -	7	V = 0.54.7	7000	7	4.56	D. C.	-22.322	4/
1.   1.   1.   1.   1.   1.   1.   1.	001-1		3,15	5.057	4.375	7: 7: 7	-1	, ,	7 - 1/10-1	0 10	1 (1)	4.315	.763	-24.253	+25.4-
		) (L	1.1.4	1 u t . 10	***		7 4 5 4 L			1	1.1	4,316	. 763	-55.004	サイジュー
10   10   10   10   10   10   10   10	1		7.	U	(51.7	1.7.			7 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1	1	100	4.315	4763	-264243	470 4-
20	Total and	9	A STATE OF S	-	3 2 41 mm	- 7444	1747			1 44 1	1000	27.5.4	.763	-25.00	073
2.445 3.464 5.454 1.453 5.157 1.453 3.74 1.4552 4.235 3.75 3.4541 1.4572 4.235 3.75 3.75 3.75 3.75 3.75 3.75 3.75 3.		447	4.7.4	175.5	124.	117.7	4.44.	アンド	1 C V	0 11 1	0 0	315	763	+58.855-	C=0 == 1
714 2.954 2.934 3.15 2.914 2.314 2.314 2.314 2.315 2.32 3.52 3.52 3.52 3.52 3.52 3.52 3.5	000	11.	3.55.5	36.50	- c x 3		A. Y	307.	7 2 2 4 4	200	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4.315	.763	-26,404	250.
1146 2.555 2.725 3.144 6.347 3.743 3.74 4.614 8.528 4.268 4.315 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.743 3.744 3.745 3.	0.0	2/7.	555.5	40.4	1 + 4 + C	5.337	٦ ، ا	7	1 1 1 1 1 1	u	2.41	415.4	7t3	-25. ±04	1504-
15. 2.054 2.57 1117 2.324 1.524 4.522 5.566 6.335 7.53 13.4 1.657 1.037 2.326 1.326	2,046	1	55.5	£ - 720	474 - 0	4 + 37 F	74.		4 4	1 1 1 2	1 4 1 1 1	4.315	743	-26. P 04	0.00
		1,1,	250	6.57	~ [ ] * [	41	7.	4 · ·	1 1	י ה ה ה	1	4.316	.763	-20,204	Stire-
; ;	400		1	37.34	47.44	477.03	777	- 44.	4	-					
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Table B-30

# 155mm XM549 (RA, launch)

	7CTBL LENCTH .5s\$45	₹ <u>₹</u> €.	ACGE LFACTE 3.014	PCAT TAL LENGTH	:	CG (FM NOSE) 3.529	9 K	PEPLA: Dianeter 1090	BANC DIAMETEM 1.016	a	NOSE FADIUS 18-877	- 8	LENGTH 0.000	
CIAMETER INCHES 6.092	_	005*505 05-41-4	17 LP-1N-50 6610.000	υp	#E1GP1 LAS 96.000	200	61 N TETST Colvidan 20.000	ACTUAL 16151 CAL/1URN 20.000	1#151 URM G00	6UN -ECFF IACFES 6.052		TEVPERATURE DES-F 55.000	#IR OENSTI'V SLUGS/FI*#2 .00/38	1114 1442 38
i	:			TABPIC CO	 CEFFICIE!	DEUCCYNAMIC CCEFFICIENTS (MATE CGEFFICIENTS EASED ON HATE	CGEFFICE	NTS EASE	C CN HATE	• C/2V1)				:
1	į	ČX	4 40	4	CPA	CYPA	CAFA	CNF A3	CAPAS	(1)	CPFISI	CNPA(S)	9	ا ارد
010	, <u>*</u>	2.503	1.5.62	4.359	1778	961	777°	104.574-1562.244	1962.244	3.087	4.121	0.52	-12.448	750
600	114	2.502	1.582	4.364	£754	-* 9€ T	424-1	109.974-1062.	1062.	200	1	0/0,	27.7.	2
. P.O.O.		2.990	1.507	5 5 9 5 5	T. (1)	1,961	1 . 24	94,539 -561,16	-,61	n -	4.615	00.1	044.41	
ئ کاری۔	1135	3.504	1.652	5.251	4354	-1-17	.07	40000	72.966 -696.183	7 (1 7 (1 1) (1 1) (1	4,604	458	17.19	1
055.	081	3,964		7.0		0.50.1-	1 4	907.26	-353.4P3	0 ( 5 - 1)	4.156	.631	-20.973	10.5
1.000	1) P	3.4	- d	1	. 46.	000	- 67 - 67	23.418	-196.678	40.4	4.235	199	-20.397	470.
00.4	9 10	1		1 75 - 4	1.44	<b>→</b>	630		-127.KP3	4.115	4.257	.763	-55.164	. 424
0.00	7 10		651.7	4 . U.S.	1.56	56.1	646	11.626	-78.75C	4.196	4.305	.750	- 54. 144	72.
200	400	77. 2	, P	4 - 1 - 2	1.722	961	.46.	9.¢19	-58.6P9	4.615	4.305	.750	-24.940	7.05
1	, ,		4.7	4.086	374.	961	599*	F.615	-48,653	4.624	4,305	.750	-26.928	3 0
1.750	195	230	2.56	3,94€	585.1	146*-	4678	7.612	-38.615	, n u	4,309	150	-26.828	0.0
2.000	747	3.665	2. F.P.P	2,703	2.150	790°+	.687	6.60.8	-28.582	C 10.7	4,309	.750	-26.828	50°-
000,7	212	100	, E 8 3	3.376	2.337	196.	,69£	5.605	-10.547	4.252	4.309	150	-26.828	250-
. 000	3	2.534	2.77	3.164	. 5.3€+	196*-	-705	4.601	-8.511	4.262	4.305	,750	-26.828	0.00
000.4	45.	250.5	2.671	2.133	2.355	196-	507.	4.601	-8.51	4.062	4.305	0.0.	679.07	0.00
5.000	.134	1.663	2.571	3,045	2.324	561	.705	4.601	-8.511	4.252	4.305	. 150	-26.828	r 
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Charles at a based the lake to be

Table B-31 155mm XM549 (RA, after burn-out)

					15547.	155WY, M549(AFTEM HA)	E 1 10)					•	•	!
	.ICIAL   EWC1P   5.6=5	N. C.	NCSE LFNGTP	RCAT TAIL LENGTH LENGTH	!	C6 (FM NOSE1 3,510	ž <del>m</del>	WEPLAT ClowETE4 .090	FANC Clameler 1.016	ı	NOSE GADILS 18.877	10	ECC* LE*GTH 0.000	
C14767EF	9,4	14 17 18-18-56 481,000	17 LE-IA-3C 6270.00C	55. 50.0	ME 10FT LBS 89+200	4.50 1.00	G1.N T#15T CAL/TUMN 20.000	ACTUAL TAIST CAL/ILEN 23.000	7*151 200	6UN-6CFF INCFES 6.092	7 3 T C C C C C C C C C C C C C C C C C C	TEWFERATURS UEG-F 59,000	AIG CENCITY SLUGS/+T*47	<117 7 * 4 7 3 6
			<b>⊅</b> E⊬C		AEHOUTNAPIC CCEFFICIENTS	TS HATE	COEFF ICH	ENTS BASEL		(1/5/3)				:
MACH.	ą	CXZ	CAA	4	CPA	CVBA	CAFA	CNFA3	CAPAS	(6,6,1)	CPFI51	CNPALS )	310	: ل
010	·11.	10	1.582	4,330	51.6	136	407	109.574-1062.244	1062.244	787	4.121	F85.	-12,864	75.74
0040	1	2022	7854	316.4	150	1 1	104-	1 0 0 0 0 0	347.754.47.550		4.161		7.0.7[-	
000		2 4 5 6 C	1.000	142.0	720	-1.174	150	77.54.0	.552.183	1 4	612	751	-15,252	9,0
655	06.	3.96.E	1.76.	45.54		-1.356	592	57.54R	57.248 -535.7P	 9 ( • )	4.165	er er	-17.556	÷.
9.0	. • Z.H.3	309.4	1.917	4.4E7G	076.	-1.443	357	963.75	14.098 -353.483	3.510	4.156		-21,377	J. / C.
1.050	-337	4.84	6.040	924.4	30501	-1-15e	504.	- HI 4 - EZ	-156.47B	54).4	4.25		454.02-	7.4.
10100	134	5.461	2.152	4.35.	1.44]	-1.174	. 445	413.4	-127.583	4.115	4 , 25 7		255.22-	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
1.200	+35+	5.932	5,157	4.263	1.564	1 35.	. 655	11.626	-74.76C	4.156	4.369		-54.532	7/
1.350	• 30¢	5.374	50:03	4.130	1.722	1.561	.477	619.5	604.05	4.03E	4.369		-25,303	
1.500	162.	4. HG5	£ 64.3	2000	1.248	1961	4.00	515.0	-48.453	4.524	4 300		-27.087	7 \ 7
1.750	-2£7	25.5	. 35. 2	3.854	1.985	196-	.695	213.6	-36.618	4.233	4.305		-27.087	
2.000	142.	3,669	2. F P.F	3.90.	2 • 15 -	7 75	.704	4.608	-28,52	₹ <b>43.4</b> -	4.365		-27.987	÷.
2 506	2154	3.004	- 2.837	3,327	2.337	, L.J.	-713	11.605	-18.547	555.4	₽ ₽ ₽		-27.087	
000.7	•184	2.534	177.5	3.115	₹36.2	1 17.	.756	4.67]	14.51	4.645	4.305	.7+7	-27.0E7	0.0.
000	156	2.05€	5.471	4 C D	2.05.5	561	.722	4.601	(15.4-	4.25	4.364	141.	-27.0P7	0 × 0 × 5
5.000	<b>134</b>	1.663	175.5	3.346	2.324	1 36 -	÷725	4.50]	-9.511	4.242	4.369	1.42.	-27.087	5
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Table B-32

## 155mm XM454 (atomic)

1x CFE	- 4.05.	1,ENGTF 1,ENGTF 0,000	. د	CG 1FW NG <e1 3.577</e1 	484 0 0	MERCAT OlameTeo D	PANE DJANETER I.OIG	a.	.05E F.101C 5.845	9	LENGTH 0.000	
. ! ! !	17 L9-18-5G 6767-900	900 Vic.	1.95 1.95 120,500	6.1 TH 157 6.1/7 LM 60.000	# 157 CHN 000	ACTEAL TWIST CAL/TER 2000	-	GUN-ECFF INCPES E+092	# G 3	TEMPEHATLEF CFG-F SS-000	#16 PENSIT*** \$LUGS/FT**** *00/30	. FEASITY 657FT** *0673P
	<b>43</b> ₹	OCYNAMIC CO	3E F F J C 1 E N	75 (GATF COF	FFF 1C LE	AEPOCYNIMIC CCEFFICIENTS (FATF COFFICIENTS BASE! ON WATE		((4577):				
ŏ		3	45		(AP.≜	CNFA3	C \ F & 5	CFFTT	(Pf 16.)	1011010	3	
.010 .010 2.846	2.164	2.4.4	1.534	- 885	503	104.664-1049.142	-145	2, 565	3.665		9.0.0	
316	1	7	25.4			708.664-1049.142	241.	2.565	3.665		0.0.0	
, t		ນ ປ ດ ຄ 	005-1			445 - 847 ab	845	5.765	3.765	34	0.0	
, u			T			76,697 -683,	•473	3.165	3.915		11.301	
0 0 7		0 0				55.6'.3 -524,	625.	3,465	3.865		-14.245	
		* i	7.	•		34,629 -348,793	.793	395.5	3.865		-18.922	1,
7 4 4		7/6-1	,	_	750.	53-135 -153	, n4.9	3.665	3.865		-15.248	•
044		10.0	105.			16.317 -12.	.673	3,715	3.865		-41.714	i
7-7-		0.10				11.46) -77,	126	3.745	3.865		-24.386	į
000		304	1.00		20:		-57.45B	3,765	3.865		-27.332	•
, r			000		· ·		,581	3.775	3,865		-31.432	
7.		1 (1 4 )	4 104 1				, 565	2.785	3,865		-3:435	·
0.0		77.			161	6.525 -27.74P	146	2,195	3.865		-31.432	· ;
476	-	1			*		55.	3,60⊑	3.865		-31.432	i
2000		77.0			10	4.542 -7	-7.516	3.615	3.865		-31.432	. i
					-613		.91 <i>e</i>	2.615	3.645		- 1.432	0.0
?		****	· · · · ·				916	3.615	3.865	4.25.7	-31.432	-

Table B-33 155mm XM718/XM741 (AV)

	10101 19001 19001 191603	25"	ACSE LPAGTH Z.842	4.08.1 4.08.11 4.05.		CG (FM 1,05E) 2,634	7 3 4	1694 101846768 193	SANC ClaweleP 1.016	Ερ. (-)	NOSE RADIUS 9.478	; 	6000 1000 1000	
1388181 186469 14899	9 %	28-18-36 28-18-36 31	74 18-77-51 18-76-55	0	# £ 16 + T L + 5 102 • 600	ىن د ئىق	G N 1#14T Crt/10#N 20+061	ACTUAL 1:151 CALXTU-N 20.000	12141 600 1000	6UN - ECFF 1:07ES 6.05E	16.5	TE-PERATURE 0EG-F 59.000	AIR CENCITY SLUGS/FI**?	7114 1443 38
1	;	,	. J0-130	) )[****	CESF 1C 18P	ARECORYNAMIC CORPRICTENTS (HATE CORPICTENTS BASED ON MATE	COLFFICE	EFTS BASE	C Ch HATE	* (C/2V))				;
,	į	1	;		o C	40,0	14.4	C N F A 2	CAPAS	CPF 11.1	(2134)	CNPA[5]	Ç,	ر. ن
ر د د ع	, x	ر مر 100 د	1 0	4 - 7 - 7	×11.7	747		11 . 006-	1 . 00F- 1052 556	255.2	4.063	60**	-11,997	
		, a c		1		1	e.	11:000-	13.004-1092.556	255.2	4 0 6 3	504.	-11.997	7.
000	601	,	7.0	7 7 7	· (-)	7 16 1	121	102.694	777 * 5 E 5 -	7.187	4.160		-11.597	
3 G		ייני מייני מייני	1 30	9.00	C 7.	070-1-	000	74.583	-712.323	0.55.0	7-164		-14.916	7:
2 4		4.5	3.0	411.5	1.115	-1.346	455.	. 519.95	-551.225	551.5	151.7		-17.591	100
	240	200.4	6.0	4 - 9 75	1.306	442-1-	245.	46.183	-354,333	3,512	4,206		-23,868	
	200	4.0	131	4 . t	. 4	-1.16	777.	24.678	-203.522	4.028	6.56		-21-195	2 .
	100	9.00	14.	4 . 4 . 7	1.47	0(0.1-	101.	14.583	-132,333	4.(87	23.3	- 1	64.088	
100	200	772.9	100	3 10 10	1.623	4 36 t	001	11.557	•	4.141	4.257		-76.591	
	274	6.037	044.2	10	1.454	1.754	. BOD	3.00 c.		4.166	4.657		664.82-	7
0.0	100		4.04	7.40.	1.0	100.1	Ξς:	E + 26 4 3	-51.133	7.1.7	4.257		32.280	77.0
7.70	700	( ) ( )	2.421	4.736	1.559	4.0	125.	7.8.7		721.7	4.257		-32.280	470
100		1			4 2 4	756	525	104.4	•	4.185	4.257		-35.280	n i
200	2.7	7.040	2.914	4.77	1.99.1	4364-	5E 3.	C 2 2 3	•	551.4	4,25		-32,480	550
100	1	2.07	700	225.4	20002	4564-	4	4.739		502.1	4. 25.2.4		042.20	70.
	201	2.4.7	30.0	400.4	2.017	- 36.	440.	4.739	588.6-	502**	4.257		-32,280	1,0
000		195	4.40	125.4	1.56	7.7.1	u	4.739		4.605	4.257		-35.780	3 60 -

Table B-34

## 155mm XM692/XM731 (AP)

		F 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		: i	3.00	200	7.7	<b>7</b> 7 0 • 1	U/C • I	5/0-1	320	250-1	760	470	620	557.	k.	154	0.50
	BCOM LENGTH 0.000	AIR CENSITY SLUGS/FT+67		0.0	-10.624	-10.824	-13.768	-10.448	-20.731	-20.665	-22.969	105.55-	-21.557	-31,557	-31,557	-31,557	-31.557	-31,557	-31,557
	1	1E		ć	1360						!	044		•	•			996	9 4 10
:	NOSE FADILS	:		CPF (5.)	7 F	4.160	4.184	151.7	4.206	4.223	6.5.4	132.4	4-257	4.257	4.257	4.25.	4.257	4.257	4.257
	و سو	GUN-ECHI INCHES 6.092	((42/3) +	(1)															
	AANC Clareter 1.016	AL 1.55 L/164 20.600	C CV FATE	CAPAS	355,501	777.685	-712.333	-521-555	-364-323	-203-525	-132,333	11.557 -82.467	0011101	-41.P22	-30.511	-20.200	600.5-	694.6-	5dd 6-
	FEFFERENCES	20-000	ATS EDSE	CNFA3	111-008-1062-556	1.7.644	74.5A3	C. L. P. 7.2	40.193	20.43	14.5R3	11.55.7	1	7.632	( C C C )	2116	4.739	4.739	4.739
44731 (44)	4 C	61 N 7 1 1 5 T C-L/TUPN 20.006	COLFF IC 18	C P, P &	200	- 475	144	. 154	3 A 5 €	. J. A.	J€ 7.	4.14	4	475	[ 14.	04.	55 T.	567.	564.
(40)  £244/2644465   	CO TPW NOVE: 3.675	50	BFEOCHNAMIC CCEFFICIENTS (421F COEFFICIENIS EDSEC ON FATE	C 1PB	7 7 1 1 1 1	7 1	-1.070	-1.36	-1.244	-1.16	-1.1.70	3 3 3 1 3 1	7	445.	436	4,44	40,4	456.	すいナー
• 44551		#F16F7 L#6 103.500	CEFFICTE	Ya.	1.10	1.030	٠٤٥.	<u>. i . a</u>	1.104	1.547	1.571	7.4.4	750	1.229	10001	1.997	6.147	5.017	. 15.
	FCAT TAIL LENTTY *255		CTABNIC	2	1 ~	2.0.	5 . 357	1:2.5	1:5.4	U'		J	24.7.4	1	5 7 W . D	516.4	,	4.04.4	7.5.7
	NCC6 FNC1F 7,8467	000°0655 141-417 14	DFF.	Ch A	7 7	1.914	1.546	2.134	50.5	2.171	2.164	1.0.0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2.4.6	2.79.	715-5	, up.	7 4 6 4 5	* a + * n;
	Ž	1x 4+1x+0 540,006		2.50	2.767	3.312	3.05	4.334	505*	5.455		7.7.0	5.507	4.007	4.267	3.545	5.975	2.467	1.961
	1014L 15701- 5.600	1 J		Š	<u> </u>	151.	-213	452.	.366	550.	400	7 7 7	, C	455.	315	215.	6033	561.	.173
		IACT TO I		ا الم	0.00	000	205	ე <b>₹</b> ₽•	000.	1.050	- 1-105	000.0	1.500	1.750	2.000	2,500	000°E.	4.000	5.000

Table B-35

## 155mm XM687 (blk can)

Legwallmeez (FLV Canste)

THE THE THE THE THE THE THE THE THE THE	00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	# L C L L L L L L L L L L L L L L L L L	23.000 C LVICEN C LVI	0000 0000 0000 0000 0000 0000 0000 0000 0000		60.8 + E.C.   10.8   10	1 1 2 2 2 3 3 1 4 3 3 1 4 3 3 1 4 3 3 1 4 3 3 1 4 3 3 1 4 3 3 1 4 3 3 1 4 3 1	4100 4100 4100 4100 4100 4100 4100 4100	A C C C C C C C C C C C C C C C C C C C
25.26.76.76.76.76.76.76.76.76.76.76.76.76.76	000 000 000 000 000 000 000 000 000 00	20 20 20 20 20 20 20 20 20 20 20 20 20 2	1	2 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	CALTILET CA CO CO CO CO CO CO CO CO CO CO CO CO CO		21 44 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	(A) (A) (A) (A) (A) (A) (A) (A) (A) (A)	
25.000 2.727 2.727 2.316 2.316 3.166 3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	02.500 0.0000 0.00	25. 27. (1.17. C. 23. 24. 24. 24. 24. 24. 24. 24. 24. 24. 24	198 F 10 18 CNF a CNF	CO 000000000000000000000000000000000000		1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CNP # 151	0.0.02.2
2.267 2.3767 2.3767 2.3167 2.3167 2.316 2.426 2.	20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 10 10 10 10 10 10 10 10 10 10 10 10 1	1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0868 TC 18 CNF a 	CNF47 CNF 113,006-1052, 113,006-1052, 113,006-1052, 113,006-1052, 113,006-1052, 12,414 - 115, 12,414 - 115,	•	=  -	CNP + + + + + + + + + + + + + + + + + + +	200.02.2
00000000000000000000000000000000000000	4 4 4 0 0 0 4 4 0 0 0 0 0 0 0 0 0 0 0 0	4 - C - C - C - C - C - C - C - C - C -	3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	44.00 44.00	CAPA1 CAPA1	:	_	4 1 mm	50.44.8
00000000000000000000000000000000000000	4140m14 60 10 10 10 10 10 10 10 10 10 10 10 10 10	111111111111111111111111111111111111111	4 4 5 5 6 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1112.006-1052. 117.006-1052. 102.694 -584. 74.412 -712.		į	5 1 m n i io e io a io io a io a io a io	<u> </u>
2 10 00 3 4 00 00 00 00 00 00 00 00 00 00 00 00 0	1 4 0 m 1 4 0 3 0 4 m 1 4 0 4 m 2 m 2 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3	1	1,454 1,454 1,078 1,464	7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	117.006-1092. 107.694 - 584. 24.947 - 717.		į	1 4 4 4 1 1 7 2 2 1 1 2 2 2 3	2 1 1 2
	4 0 U 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1000 T	1,45. -1,00. -1,46.	404 755 	102.694 -584. 74.44 - 712. 14.412 - 5514.		į	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 1 2
0 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	25.69 4 5 4 5 4 4 4 5 5 5 5 6 5 6 5 6 6 6 6 6		-1.076	- , r & r - , 2 S S S S S S S S S S S S S S S S S S	74,547 - 712. 24,5472 - 551.		į	-10	. <u></u>
250.5 254.8 254.8	4 2 4 5 7 4 4 5 7 4 4 5 7 4 4 5 7 4 4 5 7 4 4 5 7 4 4 5 7 4 4 5 7 4 4 5 7 4 4 4 5 7 4 4 4 5 7 4 4 4 5 7 4 4 4 5 7 4 4 4 5 7 4 4 4 4	1171	1-146-1-	2554	A 122 - 251 LA		į		D.
4 Q & C & C & C & C & C & C & C & C & C &	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	7		7.	444 611 44			2	
3.0.0	135.4		-1.6.4		1100 00 1			уч ( М) (	į. •
5.05	-	1-543	-1.158	2/ 4.	24.072 - 33.				ÿ.
			-1 7.9	, O P	14.443 -132.			ن د د د د د د د د د د د د د د د د د د د	• ! • !
29.00	514.4	1,623	オルア・ー	di.	11-5582-				- 0
6.037	4.710	157.	11111	7	7.14- 755			0 :	
,	4.4	-1-765-	1935		4 15 - 1 2 4D 4 5 - 1		!	2134	4.0
~ `5.4		٠ ١٧, ٦ •	3 J.	•				21.4	, ,
4.566	1. D	IJ Ţ, Œ; ♣	5 . F . I	0.	10 h			0.4	4
3.545	: 07.4	C 57	1 1 7	10.	-02- 121			0	, i
5. 5.75	010.4	20103	2 11 12 1	.5.7	. 7.39 - 5.4.			O I V	ų.
2.462	7 7	٠,١,٠	J	. 7	2.51 052.			٠٠١٥.	V
1	1964	733	3,70		44	ļ		3134	4

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Table B-36

175mm M437A1, M437A2 (HE)

17549.443741.47.4437

TY	0.00	25.021	0.00.0
70		1	PEA41045 SLUGS/FT00 DEG-F SLUGS/FT00 55.000
Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx Cx C	Cr. LATE .	~	
00	CAPAS CAPAS	PF(1) CPF(5) C	CNPA(5) CMG 415 -11,436
	104.724-1039.782	0.5.1.7	. 615 -11.53c
100   2.75   1.25   1	コー・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	5.12.4	.703 -11.536
	21 x 10 x 270 x 10 3	4.179	.728 -13.307
	504.101. 4.1. 11	4.072	-,17515.231
		4.124	.7H2 -18.377
	TAK SUCH PARK	4.18	.7re -17.158
	~ 0	4.255	.787 -18.353
	13 120 175.014	4.36%	./50 -19.6tb
	10	4.365	275.41- 046.
#### 100	20.74. 346.1	36.5	
サード	7 7 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1	5,30	.751 -15.233
	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	5 J L 4 3	.796 -19.233
###	70.000	5000	.750 -19.233
THE CONTRACT OF STREET STREET	7 ( · · · · · · · · · · · · · · · · · ·	7	.750 -19.233
		700	750 -19-233
492° (15°) 110°0 54°°0 110°0 045°	1000 mil 1 min 1 m	7 3	-19-233

Table B-37

### 8-Inch M106 (HE)

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2.2.2.1	55555		· ·			C/L/T(h 25.600	1 400	18 CP ES 18 CP ES 7.95C	20 3	16.4E E HA TI, HE UE G-F 59.000	A18 DE* 511 SLUGS/FT**	5117 1 * * 1
2	!	07400 431000 271000 00000		247.1	3, 21,912	Cutif():1: E4StC	a T.E.	( (42/3, °				:
	!		1 1 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 . /	477	CNTAS	7 4	CPF LL	CPF151		0 10	5
2.4.4 1.0.4		7 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 7 0 A	1.1/.1	24.4	85.155 -F	-616.387	2.197	3.824	16.2	-6.185	5 7 . •
			7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	110.1	; ;	1 5 2 3 5 1 T	- Jr = 3F 7	5.157	3.224		-6.187	
4 / 3 / 4 / 10 / 10 / 10 / 10 / 10 / 10 / 10		,	7	1	200-1		-740.230	17 II 61 C 1 1	715-6		-6-125.	1
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\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$			1 - 1 - 2 /	11.11	<u>.</u>		-cer-153	3.036	3.315	468	14.530	7.0
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	-	417.	1.	\J	ر د .		-51.573	577.5	3.366		-15.056	-
	-	, , , , ,	1.33	7.1.	 1)		-52.157	452.5	3,411		-16.054	1.0
		, , ,	1.473	1,7,	. 364		025.46.	5.517	3.411		-15,367	-
4		42f ÷1	; !	1/1	177		147.15	12.12	1491	- 1	-14a2P1	(1)
7		, ,	7,14.	75/	1,71	1, 2, 0	E 84 6 6 7 1	⇒00°	] 7.6		-14.281	
~ ; ·		, , , , , , , , , , , , , , , , , , ,	1.757	1	מיר		-13.064	77 47 67	3.111		-14,281	
7.0	•	ייט ג ג י	1	3,7	, T		5.745	285.5	3.411		-14.281	
44.5	Ì	, CO	7 5 1		200.		2,573	3.064	. 411		-14.21	-1.16
<u>ب</u>	•	- Ju	-	11.			2.57.3	5.54	3.411		1 4 . 7 4 1	7
31-	Ĭ		1.035		304		2.73	3.254	115.5	- 1	-14.281	1
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The second secon

Table B-38

3-Inch M426 (chemical)

ָרָבּי    -	77;AL LEMC: P	24 A	RCSE LEMGTH 2.273	BCAT TAIL LENGTH .503		CG (FM NOSE) 2.834	DIA	PEPLAT DIAMETER .069	BANE DIAMETER 1.018	9. E	NOSE RADIUS 6.010	T o	#000 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	! :
CIAMETER INCPES 7.990	-87	I3 LB-IN-SC 1804.000	77 L9-in-50	9 9	LB3 LB3 198.000	GUN CALV	GUN TEIST CAL/TURN 25.000	ACTUAL TWIST CAL/TURN 25.000	#L Twist L/Turn 25.000	GUN-EOFE INOPES 7.990	H	TEMPERATURE DEG-F S9.000	A.M. DENSITY. SLUGS/FT+#3	5117 100 100 100 100 100 100 100 100 100
			AERO	CYNAMIC	PEFFICIEN	TS CRATE C	DEFF ICI	ENTS BASE	AEROCYNAMIC CREFICIBNIS (RATE CDEFFICIENIS AASEC ON RATE	• (D/2V))				
HAC:	ð	CXS	Ž	AM.	Š	CYPA	CNPA	CNP A3	ChPAS	CPFC	CPF [5]	CNFA[5]	0.0	3
.010	121	2.339	1,702	3.383	.847	754		(15.539		20197	3.224	44.5	-5-185	029
•600	. 127	2,335	1.702	¥04.5	400.	754	480	85.589	•	2.157	3.24	166.	-0-185	500
*600	2	7364 2	1-722	3,604	2.19	754	- 255		-140,200	2,384	3.317	A 284-	-6.185	- 62
. 400	ث 1	3.422	1.778	3,903	, 639	842	106	56.757	-530.073	5.708	2.319	• 4 0 B	-E. 344	623
.650	• 208	08.40	1.996	F 20 4	318.	~1.062	.077		-407.967	2.506	3.287	.481	-10.699	. 52
1.000	.323	4.227	2:132	3.631	1.037	+26	. 191	36.369		3.031	3,315	.469	-14.530	
1.050	960.	4.658	2.239	3.556	1-246	88÷	.288	18.153	-144.027	3-155	3.347	45.5	-13.567	01
1.100	45°	5,225	252.2	3,516	000.7	84E	\$355	12.777		3.625	3,366	4 4 8	-15,036	
500	. <b>B</b> (-(	5,736	2.386	3,553	1+332	754	- +350	8.954	-	2.599	3.411		-16.054	510
1.350	3.2	1.166	2.489	3.389	1.473	154	*364	7.402		3.317	3.411		-15,367	115
1.500	.357	4.594	2.61;	3.378	1.540	75*	.371	6.620		3,327	3.411	435	-14.281	d 10 .
1.750	.334	4.044	2,712	2.165	1.659	+52.	.376	5.838		3,336	3.411		-14.281	 B
000.5	-313	3.510	2.756	3.053	1.728	754	385	5.056		3 - 3 4 5	3.411		-14.281	910
2.500	.281	2.834	2.923	2.885	1.847	. 75 t	.393	4-275		3+355	3.411	•435	-14.281	617
2000	355	1	2.880	2,656	7.897	154	2045	E64°E		3,364	3,411	•435	-14.261	7
0000	.210	1.910	2. 80	2.691	1.866	754	4.30	6.6 4.6		3.764	3.41	435	-14.201	016
5.080	. 196	1.485	2.645	£.677	1.835	754	904.	E6.4°E		3,264	3.411	.435	-14.281	015

### BEST AVAILABLE COTY

Table B-39 8-Inch M422 (atomic)

	600k 600k 6463H	AIR GENCITY SLUGS/FIGGT	CCC   Cl-   1.044   -0.01   -1.044   -0.01   -1.044   -0.01   -1.044   -0.01   -1.044   -0.01   -1.046   -0.01   -1.046   -0.01   -1.046   -0.01   -1.046   -0.01   -0.01   -1.046   -0.01
	005E 7.01C 8.00C	TEMPERATURE DEG-F 55.000	CPF(E) ChP4(5) 3.014 3.014 3.1
	PAIC C14FE76F 1+01F	GUN-ECHE INCHES 7.992	(((727)) () ((727)) ()
	FFPLAT CTAN CTAN CTAN CTAN TANK	ACTUAL TWIST CALZTER 25.000	CORFICIENTS EACE CN MATE  CNFA  -530  90.085 -863.344 -782 -81.859 -921.473 -137 -137 -125 -425 -425 -421-418 -137 -137 -137 -137 -137 -137 -137 -137
(BICHTC)	CG PFF (1846) Claim	1 N TW151 16/764N 25.006	u.
P IN-M422 (ATC-47)	=	14 14 14 14 14 14 14 14 14 14 14 14 14 1	CEEF ICLEATS (L.T.  CFA CYFA  1.023 -740  1.003 -740  1.003 -740  1.004 -833  1.034 -833  1.035 -740  1.006 -932  1.007 -740
	!	11925.000 11925.000	2.050 2.050
	15254 15751	1724.00r	CX2 2-771 3-211 3-211 3-212 4-965 4-953 4-
	LENCTH LENCTH SACZE		- 600 -

BEZL WANTER CONTRACTOR OF STREET

Table B-40 8-Inch M424 (atomic spt)

-	TCT&L FNCT+ -4.628	i i	41.07 to 1	PCA1 TA11 LEECTE 0.000		Ch (FW 405E) 3.212	1110	# # # # # # # # # # # # # # # # # # #	HANE DIAVETEN 1.018	ີ ພູນ	A05E Fartes 8.003		800k LENGTH •066	
CTAMETER INCHES 7.490		1x n=1x-e x17.003	17 L=-71-50 1] + G7 = 000	<i>ن</i> د د د	#F16+1 LH5 247.000	¥ ⊒ Ñ 3 Û	64. TM 15 T C+L714.PA 25.000	ACTUAL TATST CALZTUSE 25,000	1	GUN-FCHE INCHES 7.550	9431 0 5	18 pp 6 4 1 L m 6 D 6 G - F 5 5 , 3 0 C	AIN DEF-11'S S.LOSXF1343	711. 1563
 		:	Q 1 1 4	APPOCANAMIC CLEFFICIENTS INSTE CURFFICIENTS EASEL UN NATE	EFFTCIEN	13 (24)	COEFFICIE	1 5 E 6 SE	L Ln "ATE	((4575) 3				
۲. د ۲	Č	CXZ	Q V D	2,0	A P	3 2 7 0		CA.F.A.3	CAPAS	(64)	CPF 15.1	CNP 3 ( 5.1	5	ن.
01J*	.215	2.771	2.050	4.55.4	1.033	0 47	1.36.L	911.086	911.CR6 - A63. 364	1.514	3.014	147	77.1	-
- tuo	5	2.771	2.690	1,575	1.92	0 7 2 -		90.08	- 863.364	1.514	3.014	1.147	1.44.	-
004.	112.	3.242	2 1 1 - 2	4.161	1.003	1.74:		654.IA	- 701.199	6,114	3.116	172	1 244 1	
005	\$92.	3.531	5.613	10 CO	• 0 •	₩ 1		54.747	-354.473	3.0	3.164	040	.3.547	
055.	• 3 S &	4.065	5 4 5 4 5	550.7	1.50.1	11.00		・ヘナル・リア	617.15	2.61.	3.514	.002	-6.445	•
1.000	044.	575,4	VEE • 2	115.4	1.076	214		5 . 11	-592-593-	5 t 5 t 4	3.514	, O O •	-:1.114	) J U • I
1.050	51.	230.4	915.5	1.36	1.747	か~11・1		19.124	-153.73H	3.014	2.514	200.	-11.34	1
1.1u0	4	3.50	5.534	500.5	١٠ ، ٢٥ د	n		13.457	-91.173	400.0	3.214	₹0 J•	-13.540	· 1.
1.200	7.5	6.1.3	2,595	-11-	.53.	- 7/		454.5	-57.064	3.094	3,214	500.	-15.162	- 070
1.350	507.	5.55	2.462	J	1.27			118.1	409-04-	•114	3.514	.003	-17.178	-
1.540	5, 4,	4.527	2,75	991.5		1.7/*-		- XX -	-32.341	3.164	3.514	.005	-19.587	-
1.750	444	4.364	5,842	ar.1.5	1.4.1	/40		1.165	-24.154	3.134	3.214	.602	-19.587	511.
2.000	517.	3.7.16	7.5.2	( ) ·	75	07/*-		£ 4C + 5	-15.425	3.144	3.214	200°	-19.587	3 1 5
5.5.10	3,4.	3-176	4000	1/2.7	11.41	-, 741)		4.52)	-7.659	404.5	7.214	-005	-19.547	<u>.</u>
J00.	455.	2.483	r () • ()	1 24. 4	364.1	740		7.641	625.	3.154	3.214	-005	-19.587	
J00.7	もない。	512.5	C - M - 2	4 . 4	1.565	741)		3.657	525.	3.164	3.214	-005	-19.587	
5.00d	. 70	1 7.46	1,000		,,,,									

Table B-41

## 8-Inch M404 (ICM)

	NOSE ECC* HAULS LENGTH	GIA-ECKE IEWPERALFE AIG PEASITY  ILCCES UEG-F SLUGS/F14*9  1.7-950 55.0:0	(16/241)	CUFIST ChPA(S) CMO	22.25.2 2.27.2 .32.2 16.276 2.2.3	346. 46. 300	3,363 .436	739-1- 605 53E.		9,350 a482 133050 9,446 14,850		200.51 East. 201.00		031.10.1 00%.	1 0100 PM 1 010 PM 1	2 465 463 -33,826	463 -13.H26 -	3,459 .463 -13,226	
	H2NC C10YE1ER	AC:LAL_1x15161: CAL71C-A 1	BSEC ON WATE W	50473	7'		06 -740.556	61.5408-111		61 -144-111		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1					74 74 75 75		
	2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1977 - 157 - 1967 1977 - 157 1977 - 1977 1977 - 1977	AF THE TOTAL COPPLICATION OF STRUCTS PROSE ON WATE	C 60%			31c 77-Fuk			_				•			37.5		
414.			A16 (#31F)		1 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	, , , · ·	692*-	17.	10.7	52.	71.1	·	7,7/	7	411.	F 1/ " -	£ 1/ ° -	£ 1/ 4 -	557 *-
:	<u>.</u> <u>e</u> 1.	FEICET L=5 L=5 C=00+C00	ACOLFICE		<u>.</u> ت	, ,	4.7.4		_										
	1 5 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 2 1	*	) - 61 Y Y 6 - 1C		( b		۰.						-						
	P C S C T F	1 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ž	i			- 1												
		1x 1x1 1x2 1x3 1x4 1x4 1x4 1x4 1x4 1x4 1x4 1x4 1x4 1x4																	7
	10131 LENGTE	ر ر 4			Ĭ		-												- <del> </del>
	٠	1 4 6 71 .			× 40 m	ان ا •	ن د : ن د : ن		٠,	1.50					١٠٦٠	) · · · ·		` .	)



Table B-42 8-Inch M509E1 (ICM)

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, ! :	(SENSTIVE)		- 020 - 020 - 026 - 016
LE C 21	LUSS/P. ************************************	25.000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	25.687 -25.687 -25.687 -25.587 -25.587
د -	.₽₽₩∧Тÿ₩₽ 06G-F 55.00		695. 1995. 1995.
4056 64010° 11.732	் ர	- 1	200 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
3 22	1,000 C. (1,000)		2.561 2.590 2.590 2.590 2.590
1 A K E T E E E E E E E E E E E E E E E E E	0, 14141 (71645 (3,693) 646 (5, 6816	CAPPS CO202411 10724411 10724411 10724411 107241 107241 1072411 1072411 1072411 1072411 1072411 1072411 107241	-26-716 -15-947 -7-178 -7-178
- 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4	COLVICTOR 15-15-15-15-15-15-15-15-15-15-15-15-15-1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 4 4 4 1 1 1 1 4 4 2 1 2 1 4 4 2 1 2 1 2 1 2 1
•	or telet Clates Erra		- 7 7 7 7 - 7 7 7 7 - 7 7 7 7
(3 th 14)	10 10 10 10 10 10 10 10 10 10 10 10 10 1		7 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
	145134 1453 2654 2654 2654 2654 2654 2654 2654 2654		
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	11 11 12 12 12 12 12 12 12 12 12 12 12 1	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	111111111111111111111111111111111111111
N   N   1   1   1   1   1   1   1   1	5 15 47 5 1 7 14 5 1 7 14		7 \ C   7 C
	9 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		> 3 U 1 P P P P P P P P P P P P P P P P P P
10 10 10 10 10 10 10 10 10 10 10 10 10 1	- 1	11077111211	* ( ~ ) ~ (
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Table 5-43		VMARROFU (	<

A CONTRACTOR AND A CONTRACTOR
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ర్వికేశ్రీ కారా కోడ్డికి కారా కోడ్డికి కారా కోడ్డికి కారా కోడ్డికి కారా కోడ్డికి కారా కోడ్డికి కారా కోడ్డికి క కార్పులో
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1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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Table B-44

8-inch XM650E4 (RA, after burn-out)

	TCTAL LENCIN - 5.485	;	A CSE FA G 1 F 1 # 90 F	BCAT TATE LENGTH	A 11.	CG 1FM 1465E1 3.600	0 P	PEPLA1 R0 21 AMETER 03 AM 1.	Hanc 11 a m E 15 A 1 - 0 l B	NOSE FAULC 20.325	3	EOGM LENGTH	!
1APETER 1ACPES 7.950	<b>]</b>	000*5565 55-11-67	17 L6-18-56 14594-000	+8.6 000	WEIGHT LUS IP7.660	900 110	GIN TEFST CALTIUM 25.000	ACILAL INIST CALTICAN 23.000	6UN -ECFF INTEES 7.950	#. 0 0	15PERATURE DEG-7 59.000	AIR DEASITY SLUGS/FT***	5117 1447 3
			386	OCTHANIC O	CCEFFICIE	) 3104) 514	CEFF LC 16	CCEFFICIENTS MASED ON MATE	TE * (C/2V))			:	
* D # C *	5	245	Š.	Q 20	CPA	0 V Fr	CNFA	CAPA3 CAPA		, PF 18	1914047	3	i
0.0.	4.4.	265	1.722	4.40	1,141	624	604	3.2-1001-17/5-901	٠.	200	26.5	ָרְיַבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְיִבְּיִרְ	3
900	٠. ۱	2.465	1.728	4.673	1:127	-,923	-,69,	194.524-1011-458		107	35.5		•
a i	- 147	2.959	4.4	3,00	1. )25	675	428	101-469- 201-69		2 60.7	1.4	0.3	
ا ن ا خ ا	163	3.4.5	752.	5.0.5	.817	F 6033	132	70-940 -671-50		40	0.0	יייייייייייייייייייייייייייייייייייייי	
10.4	- 0 3	3.876	1.5.	5.055	45.5	-1.33e	105	55.693 -519.431	3.683	2 - 11 - 6	4.7	12.409	1 1
000	۲: د :	4.337	, 40.2	4 • € ] ?	1.244	#5[•!-	.646	3306 -342.56.		450.4	6.0	-16.402	
000	y .	3		4.45]	0.	-1.83	-362	22.754 -150.05		4.15.	570	-16-243	
ם סחדידי	,	2,75	2 1 6	7 2 4 4	1.562	-1,133	114.	16.051 -123.00		4.141	555	-18-119	
0020			4100	75.4	1.614	526-	.432	11.290 -75.430		4.162	955	-20.181	, ic
		1	7	4 . 6 6 5	1.733	E 55.	.457	4.342 -55.418		4.163	.538	-21.624	
	- I c	7.7	6.477	, 7 £	7.6.	923	557"	8.366 -46.15		4.182	.538	.24.269	
0.00	2 2 2	7	or i	4.14	2.045	6.25	.457	7.39r -36.354		4.192	53.9	-24-269	
0000	100	3.4.5	5.715	(c) (c)	5.187	523	7675	6.414 -26.64		4 8.	538	947.46	
		2.564	C 70 C.	5.5	2.3.7	953	J & 3.	5.43P ~16.8E		4.122	300	24.240	•
3-000	102.	2.500	5.77	170	5,403	625.	757.	4-467 -7-154		100	e.	1040.404	
0.00	.163	2. Je	5.47	3 2 4	2.371	E25	757.	4.44.2 -7.164		4.182	30.00	044.44	
000		1.637	7 7 7 7	3.246	2 - 34	£ 5.7 • 1	707.	4-465 -7.154	•	7	9.00	24.260	

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Table E-45 8-Inch XM711 (RE)

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Table B-46

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Table B-47

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Table B-48

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#### APPENDIX C

CANNON-LAUNCHED GUIDED PROJECTILE AERODYNAMIC DATA
XM712 AD configuration

This summarizes the pertinent data and conclusions pertaining to the aerodynamic characteristics and flight test performance of the Cannon Launched Guided Projectile (CLGP) configuration. The development of the aerodynamic characterization of this configuration is briefly summarized, including both theoretical analyses and wind tunnel and flight test results.

A combination of theoretical analyses, wind tunnel testing and flight testing was utilized to examine the aerodynamic performance capabilities of the CLGP airframe. The aerodynamic properties of the first basic CLGP configuration were obtained by utilizing the Martin-developed CAMS computer program. The CAMS (Computer Aided Missile Synthesis) program aerodynamic module is basically a computerized adaptation and extension of the US Air Force DATCOM Stability and Control Handbook. The CAMS program contains provisions to evaluate both linear and nonlinear contributions to aerodynamic coefficients, including the influence on all lifting surfaces of vortices generated by forward lifting surfaces, body vortex effects on lifting surfaces, and stall characteristics. Initial CLGP aerodynamics were based on a configuration with a length of 47 inches, corresponding to the alternate proposed configuration.

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In order to verify the aerodynamic characteristics as predicted by the CAMS program, a wind tunnel test was also conducted during the proposal preparation. A 75 percent scale model was constructed of aluminum with high strength steel fins was used. This model included bourrelets and the rear-mounted obturator. The test were conducted in the Ling-Temco Vought 4-foot, high speed wind tunnel facility through a Mach number range of 0.4 to 2.2, with Reynold's numbers of 6.55x10<sup>6</sup> to 7.07x106 per foot. The model was mounted on a bent sting that had an angle-of-attack range of from -5 to +3.3 degrees. The tail fins were manually adjustable with settings at 5-degree increments from -25 to +10 degrees. Data from the wind tunnel test in general substantiated the predicted aerodynamic characteristics as developed by the CAMS program, with the following exceptions. To obtain equivalent trim values of normal force coefficient, the test indicated a required increase in angle of attack of 2 to 3 degrees and approximately a 5-degree increase in fin deflection. Extraction of linear values of normal force, pitching moment and control power from test data at subsonic Mach numbers revealed a reduction from predicted values of 30 to 35 percent. Following the wind tunnel test, aerodynamic coefficient revisions were incorporated in the 6-degree-of-freedom system simulation program in order to bring the aerodynamic data inputs into agreement with the wind tunnel results.

Because the wind tunnel test was conducted on a 75 percent scale model of the 47-inch proposed alternate baseline configuration, it was necessary to apply corrections in order to characterize the 54-inch airframe. These corrections were based upon theoretical modifications to the 47-inch wind tunnel data.

The addition of four strakes to the optical nose cone of the Baseline CLGP produced a new configuration identified as Baseline III. Estimated aerodynamic characteristics of this configuration were obtained by applying theoretical corrections to the baseline aerodynamics in order to account for the four large strakes on the nose.

At the time the Baseline III aerodynamic characteristics were developed, it was recognized that another wind tunnel test would be required in order to verify the predicted coefficients. A series of tests was conducted in May 1972 at both the Ling-Temco-Vought High Speed Wind Tunnel and the Arnold Engineering Development Center Propulsion Wind Tunnel (4T). In general, substantiation of earlier data was obtained, with the exception that the Baseline III configuration with large-size strakes was found, during the LTV test, to be statically unstable at the higher Mach numbers. Therefore, emphasis during the AEDC test was placed on a configuration with a very much reduced strake area which was subsequently to develop into the current Baseline IV configuration. The aerodynamic characteristics of the Baseline IV airframe are given. These data represent the current aerodynamic characterization of the CLGP configuration.

The following four plots (Figures 2 through 5) present out-of-plane aerodynamic coefficients on a body axis system for roll attitudes of 6, 22.5, 45, and 90 degrees. They were derived from the AEDC wind tunnel test data, and are based on 5 degrees of roll command. They are directly applicable to the pitching and yawing moments deriving from vertical fin (numbers 1 and 3) roll deflections. The similar contributions of the horizontal fins (numbers 2 and 4) may be obtained from the four plots as follows:

Use 
$$\phi = 0^{\circ}$$
 for  $\phi = 90^{\circ}$ 

$$\phi = 22.5^{\circ}$$
 for  $\phi = 112.5^{\circ}$ 

$$\phi = 45^{\circ}$$
 for  $\phi = 135^{\circ}$ 

$$\phi = 90^{\circ}$$
 for  $\phi = 0^{\circ}$ 
and switch  $C_{MP}$  and  $C_{MY}$ 

$$c and \beta$$

where  $C_{MP}$  is the pitching moment coefficient

 $C_{MV}$  is the yawing moment coefficient

α is the pitch angle of attack

 $\beta$  is the yaw angle of attack

With the addition of these out-of-plane coefficients to the aerodynamics, the test flight coning behavior was then predicted.

Examination of flight test results also printed out a discrepancy between predicted and actual roll rates during ballistic flight. Roll rates were typically 10 to 20 percent lower than predicted. Roll power was subsequently redefined as a function of total fin incident angle rather than the previous fin deflection alone. Fin incident angle is defined as the sum of free-stream or body angle of attack, fin deflection, and body upwash. In the lateral case, it is the sum of body sideslip angle, fin deflection, and body sidewash. Since the CLGP is symmetrical about its X-X axis, angle of attack and body upwash are interchangeable with sideslip angle and body sidewash.

To evaluate body upwash (and sidewash), plots of angle of attack versus pitching moment coefficient were drawn for the body along and for the body plus fins at several fin deflections. At the angle of attack for which the body and the body plus deflected (in pitch moment coefficients are equal, the fin incident angle must be zero. Knowing the angle of attack and fin deflection for each intersection then provides a solution for body upwash as a function of angle of attack and thus the slope of upwash with angle of attack. Those solutions were repeated for each of the wind tunnel data Mach numbers to provide the upwash slope variation with Mach number.

With the fin incident angle thus defined, roll power was then generated from the wind tunnel data as a function of this angle for several Mach numbers. These data are shown on Figure 6. Note that total rolling moment coefficient is then defined as:

$$C_{\varrho} = C_{\varrho} \quad M, \, \delta_{1} - \beta \quad 1 + \frac{d\alpha}{d\beta}$$

$$+ C_{\varrho} \quad M, \, \delta_{2} - \alpha \quad 1 + \frac{d\epsilon}{d\alpha}$$

$$+ C_{\varrho} \quad M, \, \delta_{3} + \beta \quad 1 + \frac{d\alpha}{d\beta}$$

$$+ C_{\varrho} \quad M, \, \delta_{4} + \alpha \quad 1 + \frac{d\epsilon}{d\alpha}$$

This inclusion of upward (or sidewash) in the aerodynamics then provided a close match with test roll rates.

In summary, the aerodynamics as presented in this report are considered adequate to describe the AD CLGP flight environment as verified by comparison with test flights. The major conclusion to be drawn from this report is that, based upon existing flight test data and analyses, the Baseline IV Final Aerodynamics appear to adequately describe the CLGP airframe aerodynamic characteristics.

The included curves of aerodynamic coefficients are those data recommended for use in flight simulations of the CLGP projectile. Stability and control, axial force, roll characteristics, and damping derivatives have been given for projectile roll attitudes of 0 and 45 degrees.

The data curves given were based on wind tunnel data measured on a 75 percent scale model tested during May 1972. Figure 7 presents the axis system and sign convention. Reference area and length for all coefficients were 0.196 ft<sup>2</sup> and 0.5 ft, respectively. The collected aerodynamic coefficients are plotted in Figures 8-34.

Figure 1 in the report from which this Appendix C is excerpted was not needed.

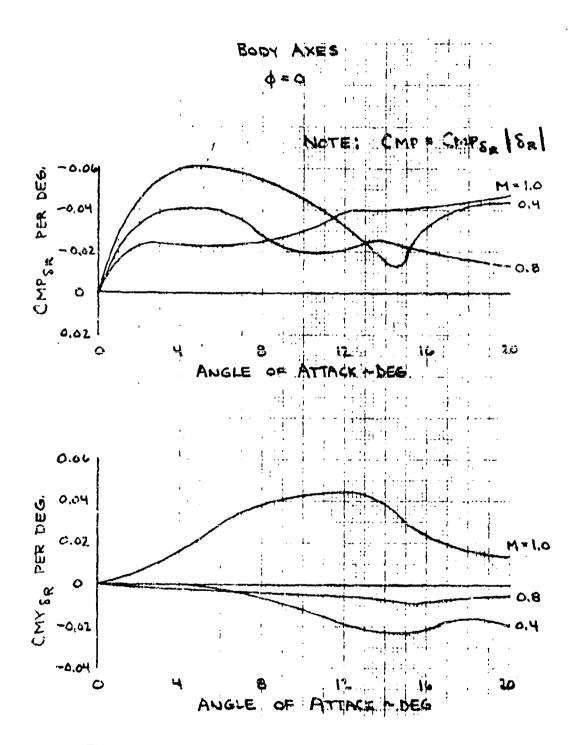


Fig 2. Pitching moment and yawing moment due to roll command

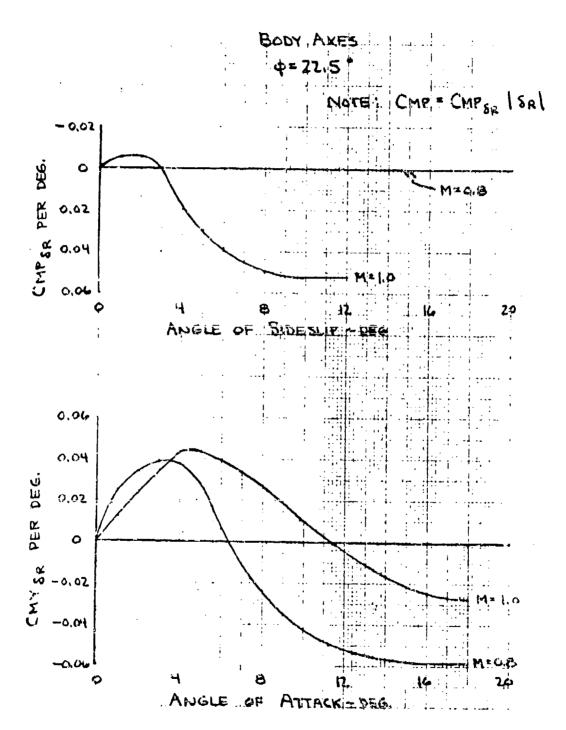


Fig 3. Pitching moment and yawing moment due to roll command

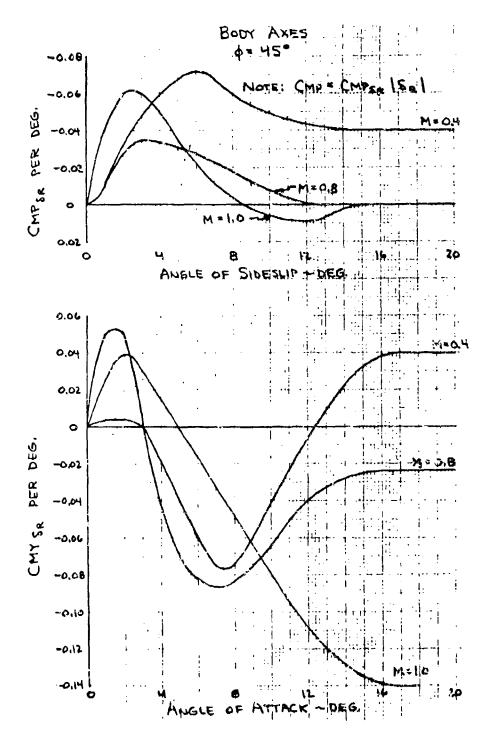


Fig 4. Pitching moment and yawing moment due to roll command

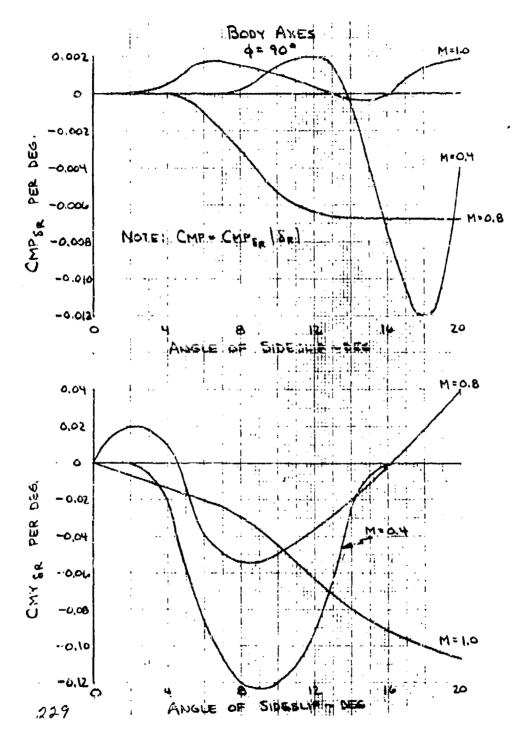


Fig 5. Pitching moment and yawing moment due to roll command

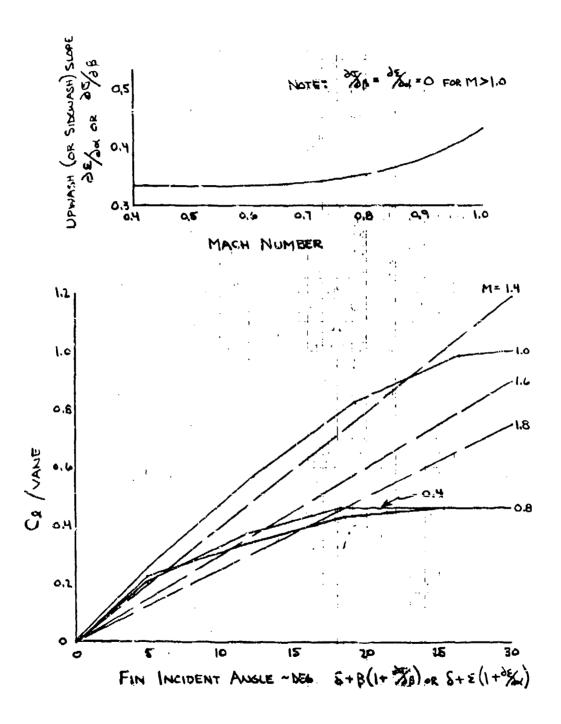


Fig 6. Roll power

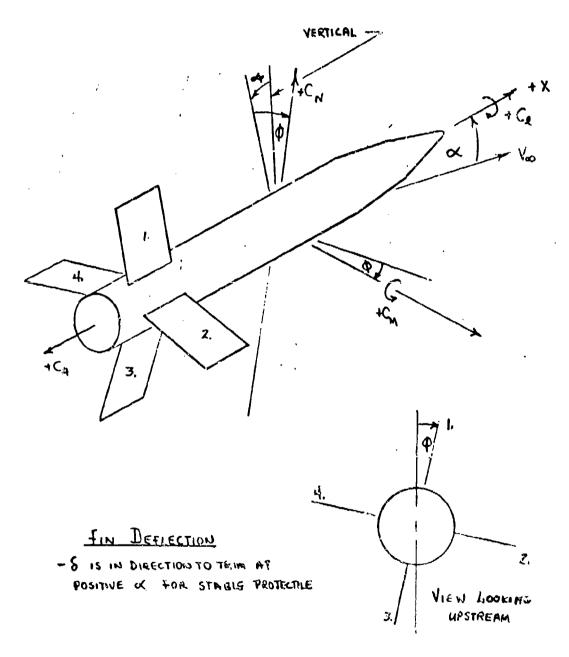


Fig 7. Axis system and sign convention

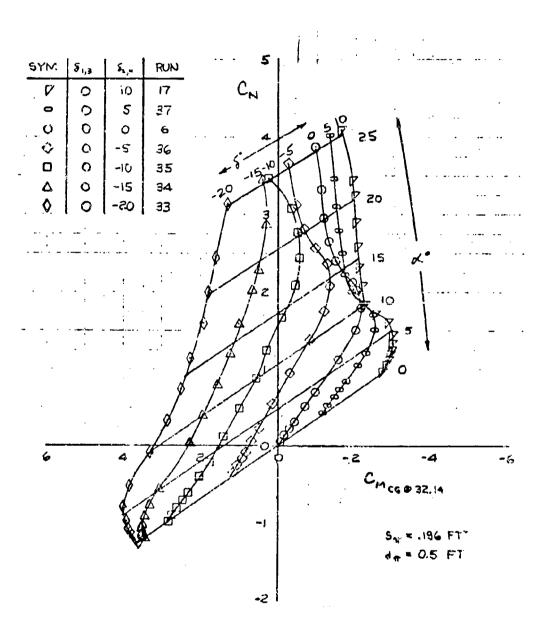


Fig. 8. Lon., tudinal stability, M = 0.4,  $\phi = 0^{\circ}$ 

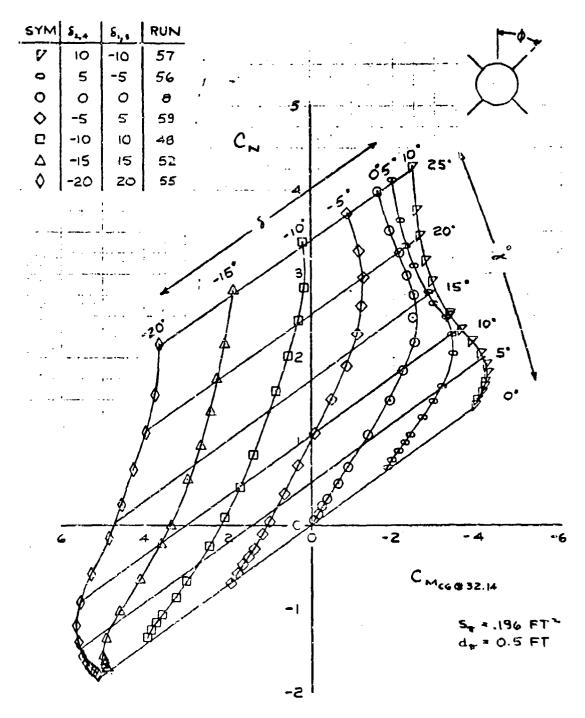


Fig 9. Longitudinal stability, M = 0.4,  $\phi = 45^{\circ}$ 

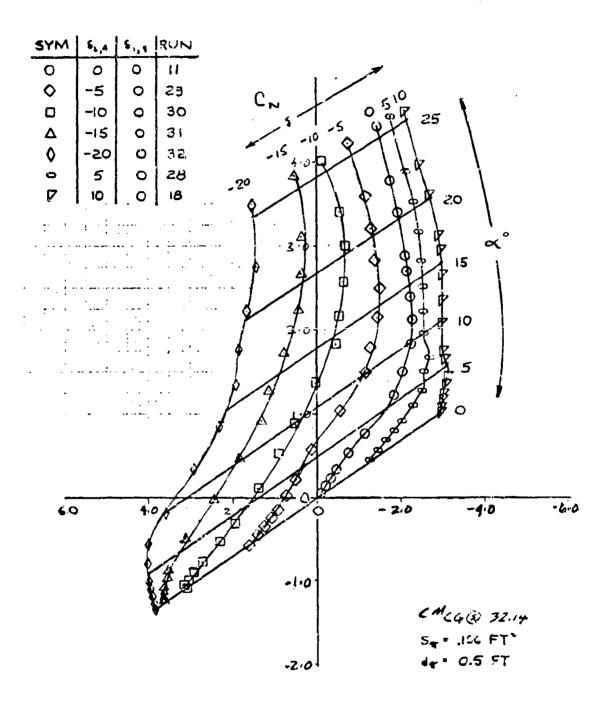


Fig 19. Longitudinal stability, M = 0.8,  $\phi = 0^{\circ}$ 

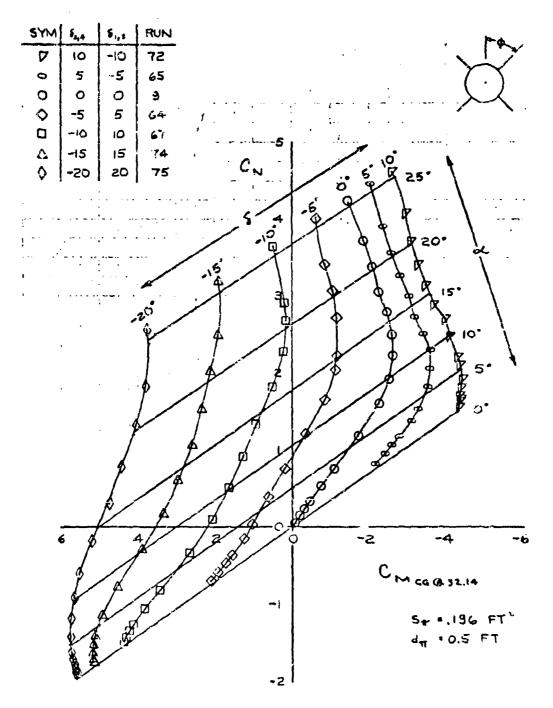


Fig 11. Longitudinal stability, M = 0.8,  $\phi$  = 45°

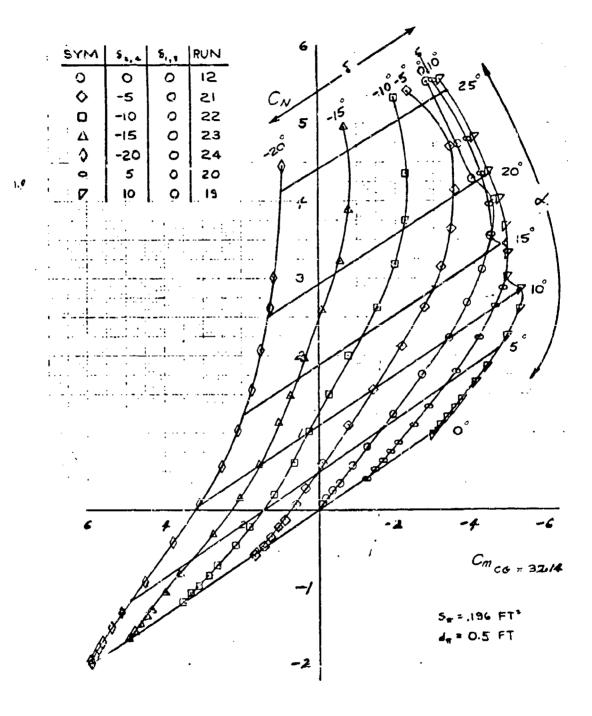


Fig 12. Longitudinal stability, M = 1.0,  $\phi = 0^{\circ}$ 

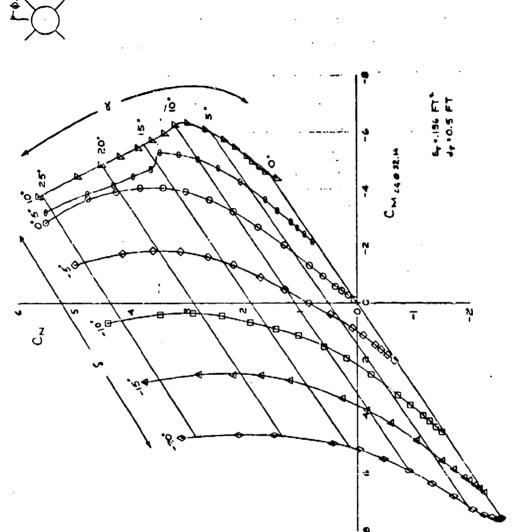


Fig 13. Longitudinal stability, M = 1.0,  $\phi = 45^{\rm o}$ 

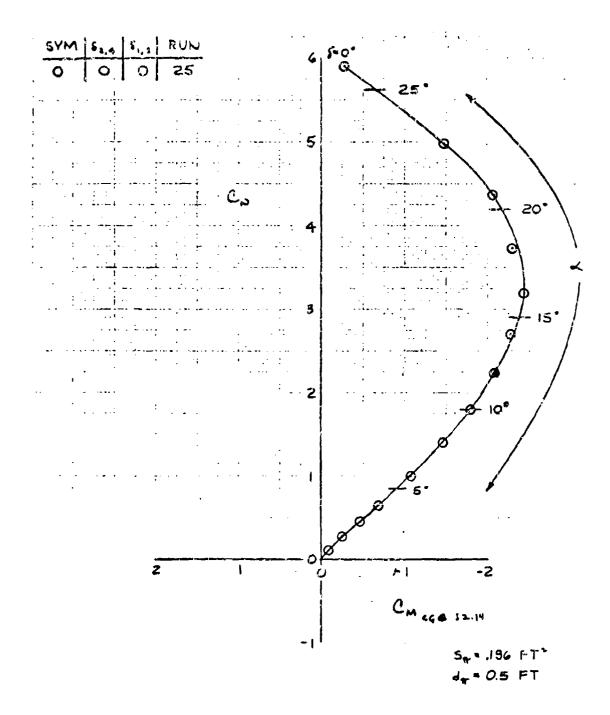


Fig 14. Longitudinal stability, M = 1.3,  $\phi = 0^{\circ}$ 

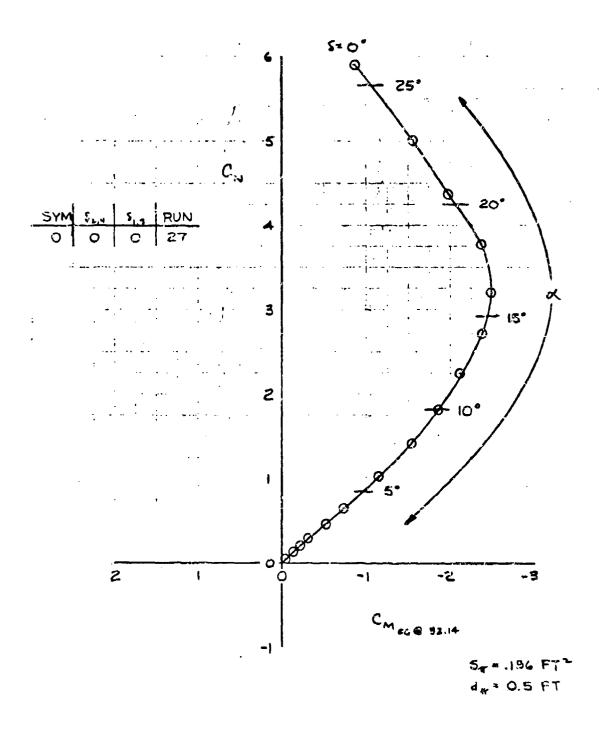


Fig 15. Longitudinal stability, M = 1.3,  $\phi = 45^{\circ}$ 

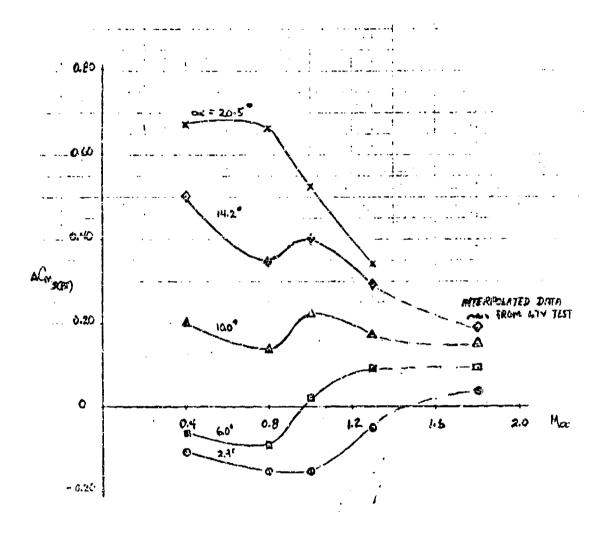


Fig 16. Pitching moment due to strake  $S_{\delta}$ ,  $\dot{\phi}$  =  $0^{\circ}$ 

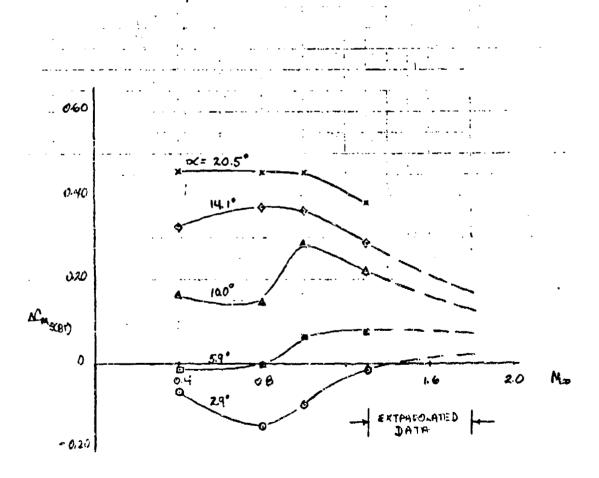


Fig 17. Pitching moment due to strake  $S_6$ ,  $\phi = 45^\circ$ 

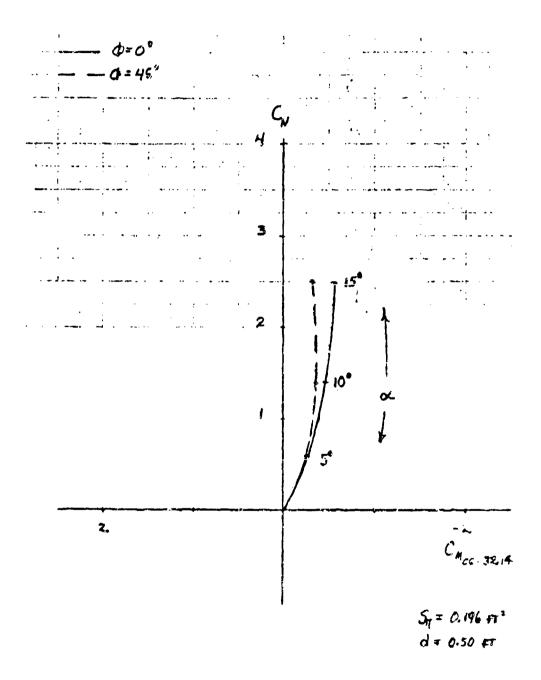


Fig 18. Longitudinal stability, M = 1.8

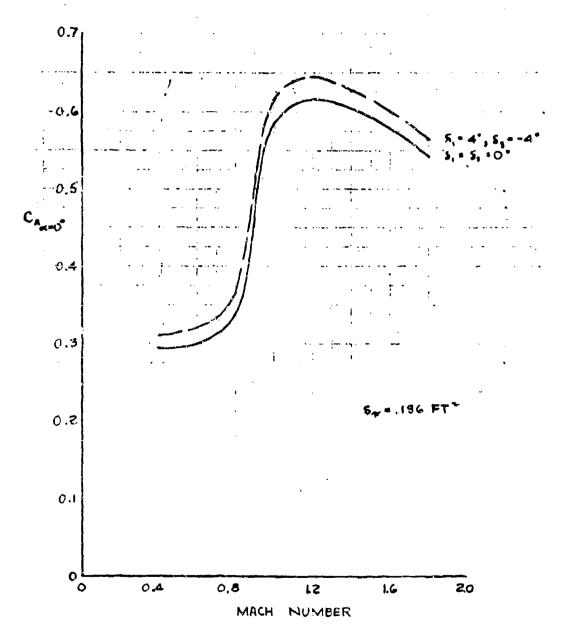


Fig 19. Axial Force,  $\phi = 0^{\circ}$  & 45°,  $\alpha = 0^{\circ}$ ,  $\delta_{2,4} = 0^{\circ}$ , altitude = 4000 ft

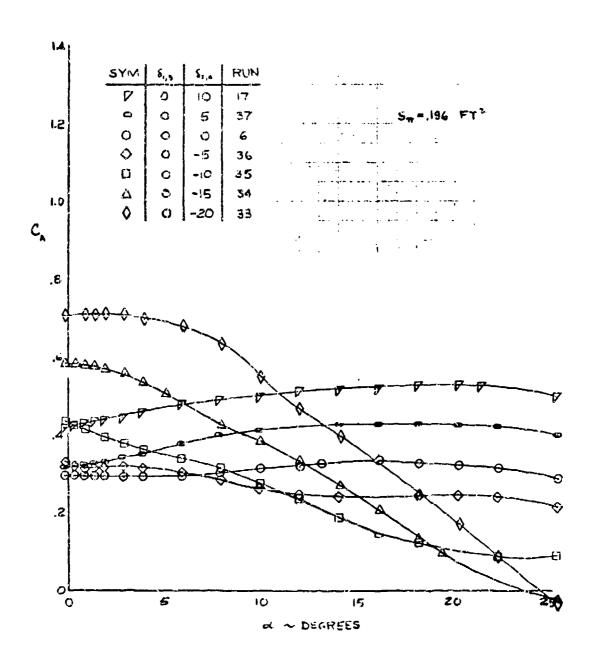


Fig 20. Axial Force M = 0.4,  $\phi$  = 0°, altitude = 4000 ft

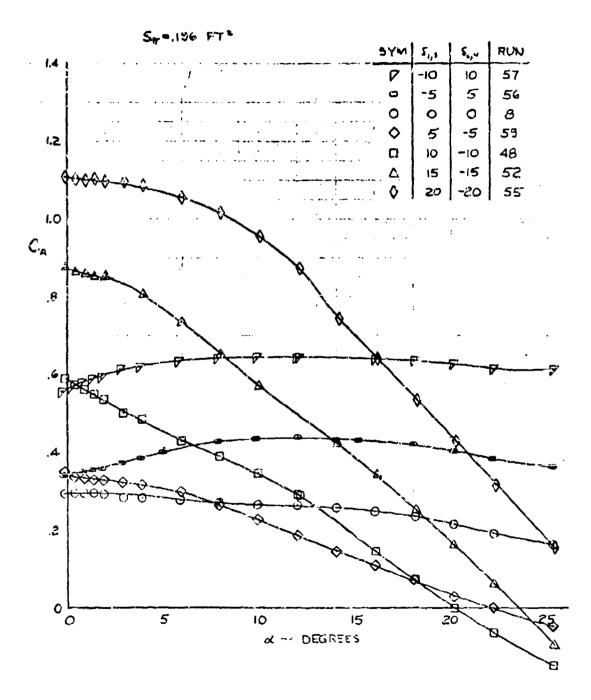


Fig 21. Axial Force M = 0.4,  $\phi$  = 45°, altitude = 4000 ft

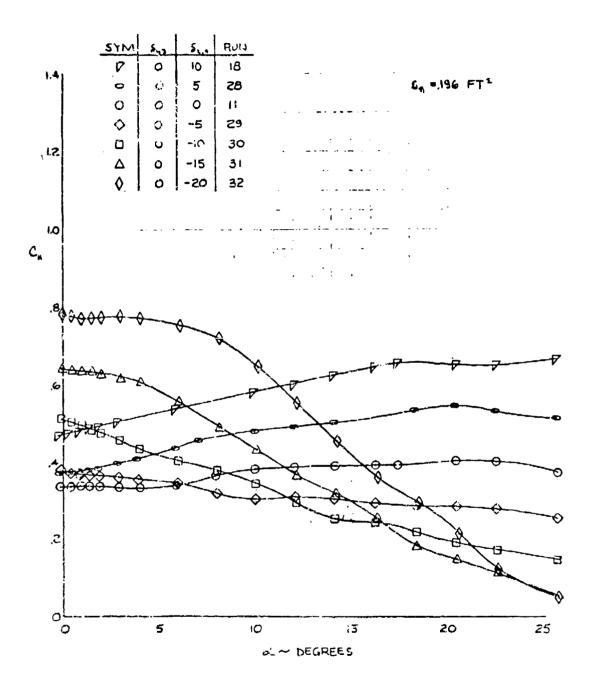


Fig 22 Axial force M = 0.8,  $\phi$  = 0° altitude = 4000 ft

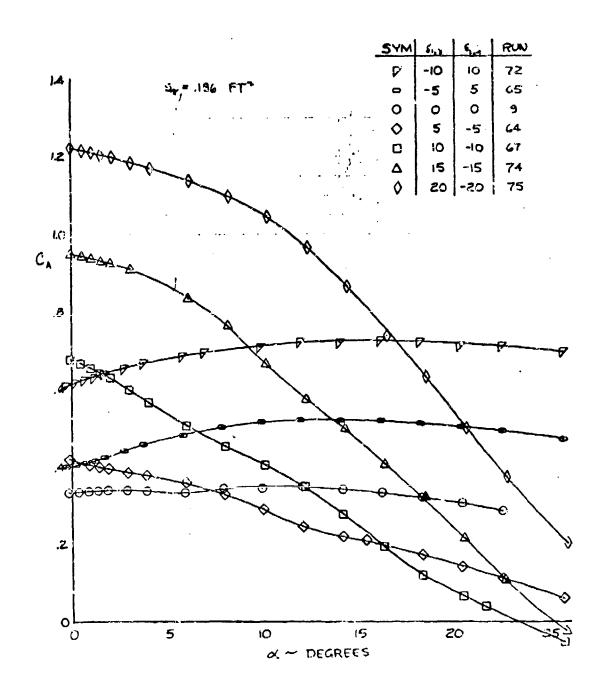


Fig 23. Axial force M = 0.8,  $\phi$  = 45°, altitude = 4000 ft

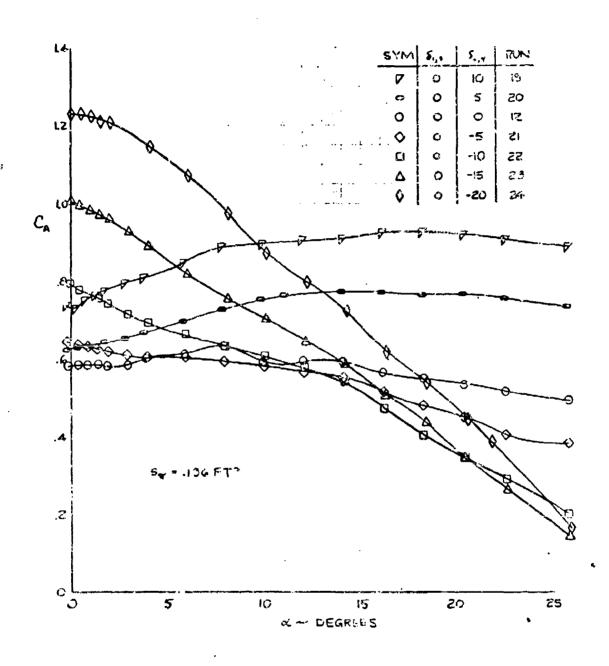


Fig 28. Axial force M = 1.0,  $\phi$  = 0% altitude = 4000 ft

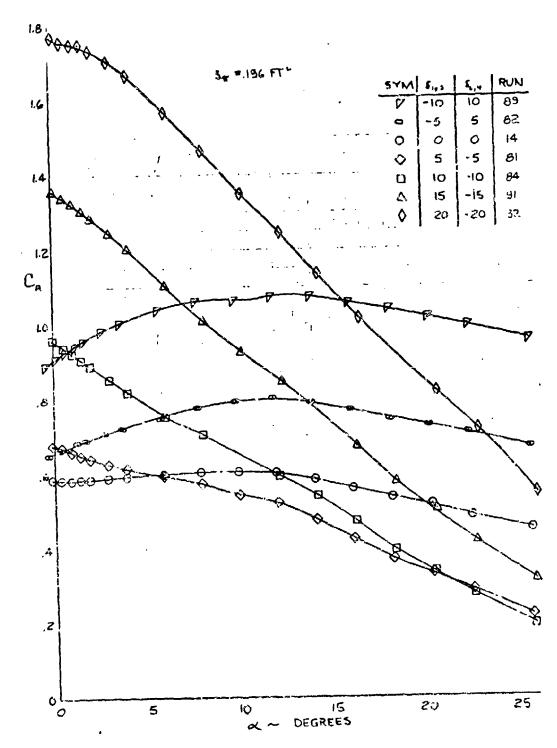


Fig 25. Axial force M = 1.0,  $\phi = 45$ , altitude = 4000 ft

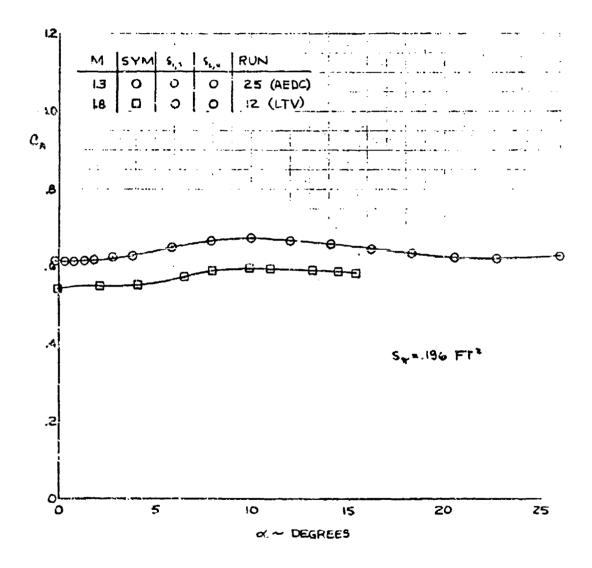


Fig 26. Axial force M = 1.3 & 1.8,  $\phi$  = 0°, altitude = 4000 ft,  $\delta_1$  ,  $\delta_2$  =  $\delta_2$  ,  $\delta_3$  =  $\delta_4$  = 0

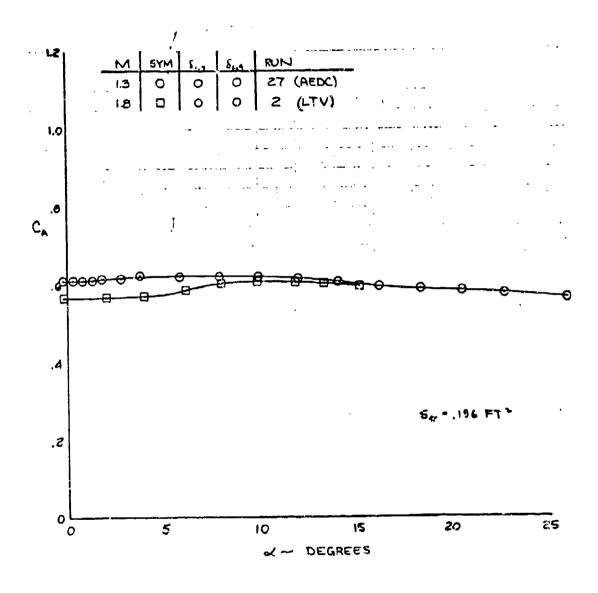


Fig 27. Axial force M = 1.3 & 1.8,  $\phi$  = 45° altitude = 4000 ft.  $\delta_1$ ,  $\delta_2$ ,  $\delta_3$  =  $\delta_2$ ,  $\delta_4$  = 0

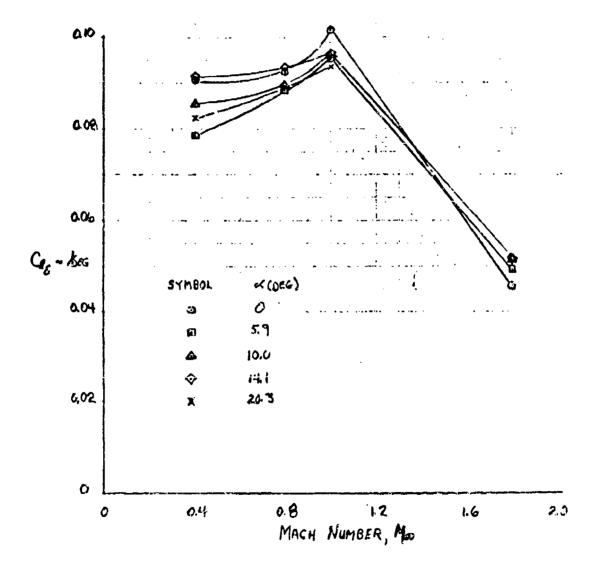


Fig 28. Roll power,  $C_{\chi}$ ,  $\phi = 0^{\circ}$ 

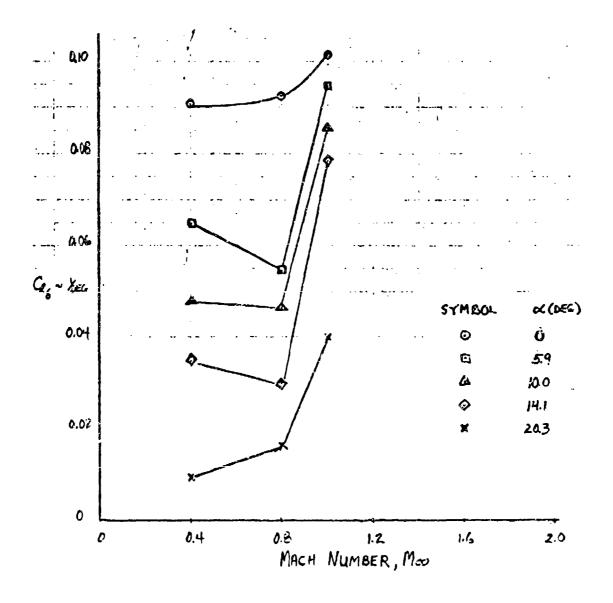
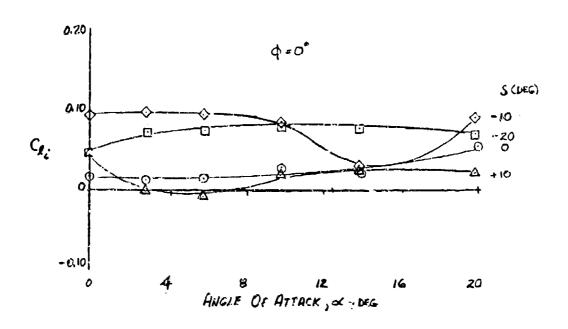


Fig 29. Roll power,  $C_{\chi}$ ,  $\phi = 45^{\circ}$ 



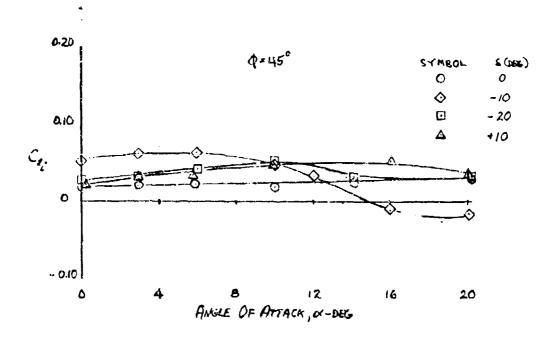


Fig 30. Induced roll coefficient,M∞ = 0.4

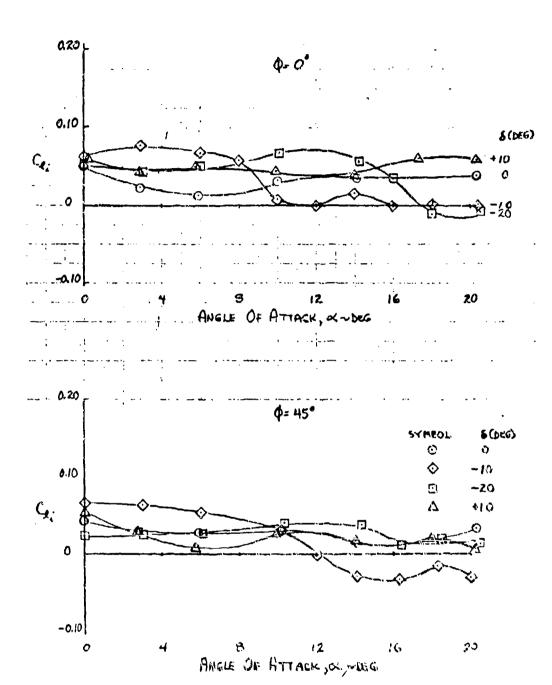
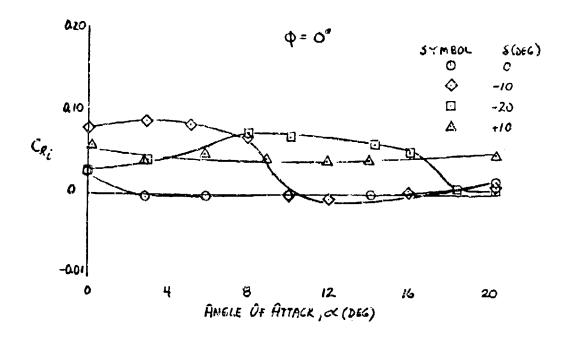


Fig 31. Induced roll coefficient, Mai = 0.8



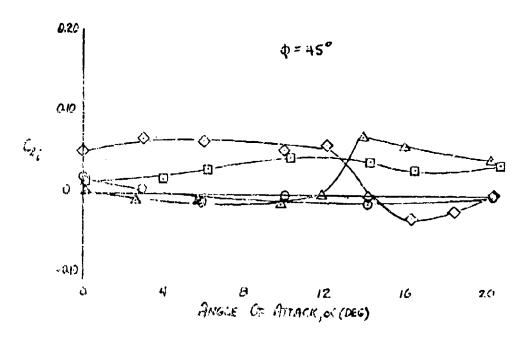


Fig. 32. Induced not coefficient,  $M \approx \pm 1.0$ 

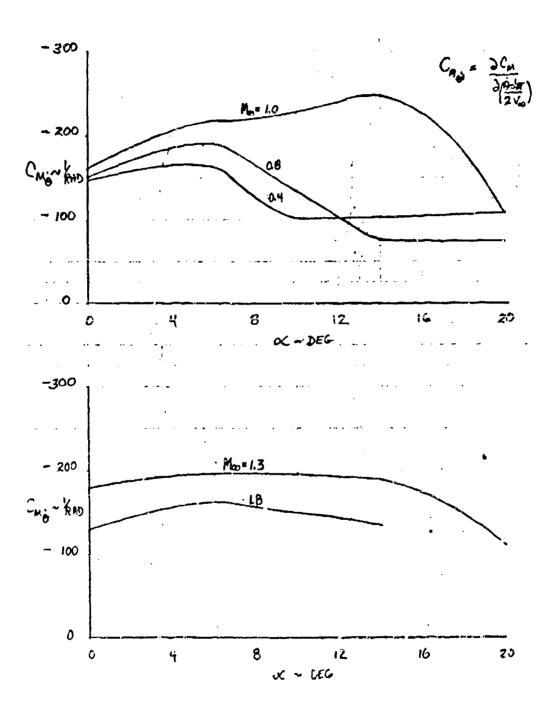


Fig 33. Pitch damping,  $\delta = 0^{\circ}$ 

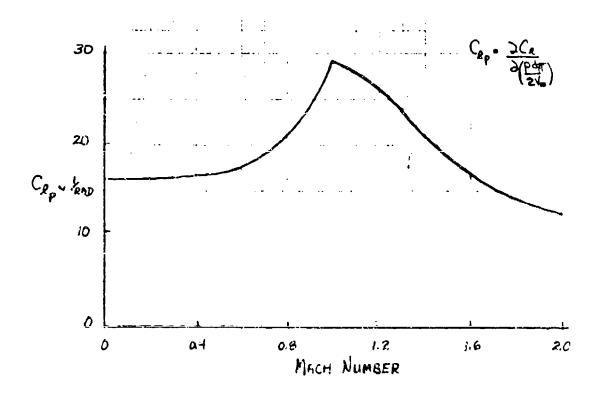


Fig 34. Roll damping,  $C_{\Omega}$ ,  $\alpha = 0^{\circ}$ 

# APPENDIX C CANNON-LAUNCHED GUIDED PROJECTILE AERODYNAMIC DATA XM712 ED configuration

#### GEOMETRY AND MASS PROPERTIES

These are presented in Figure 35.

#### AERODYNAMIC PROPERTIES

Static stability, drag buildup, and control effectiveness data were obtained from a 75-percent scale model wind tunnel test conducted in March 1975. Theoretical calculations were performed to define the dynamic damping coefficients. The values calculated were then correlated with similar data for the AD CLGP, with good agreement. No aerodynamic cross coupling and control interaction effects were measured.

The aerodynamic data on Figures 36 through 49 are presented in a body axis system about a center of gravity located 5.17 calibers aft of the nose. The reference area is  $0.196~\rm{ft}^2$  and the reference length is  $0.5~\rm{foot}$ .

Potentially critical configuration areas have been minimized in the proposed configuration. The fins were sized to provide a one-half caliber static margin at the highest launch Mach number. The wings were then sized to maximize trim load factor capability at the lower mach numbers that will be encountered in maneuvering flight, and at the same time, be compatible with the span restrictions imposed by the foldout concept.

Model buildup runs were conducted to provide critical evaluation of forebody, base, fin, and wing drag. The effects of bournelets, open slotted control housing, and engraved obtunator were evaluated during AD testing. These data confirm provided configuration range performance.

During AD flight testing, configuration instabilities arising from aerodynamic cross coupling were experienced. Consequently these cross coupling coefficients were estimated

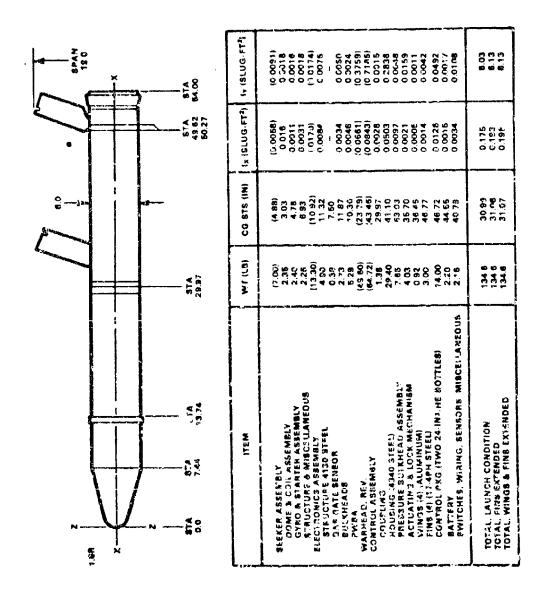


Fig 35. Geometry and mass properties

¥.

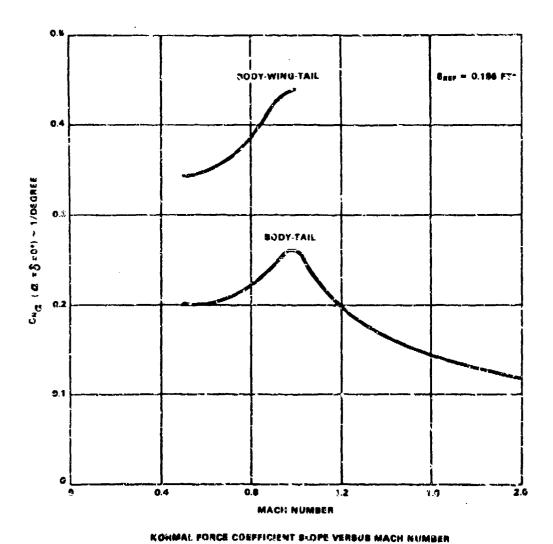


Fig 36. Normal force coefficient slope versus Mach number

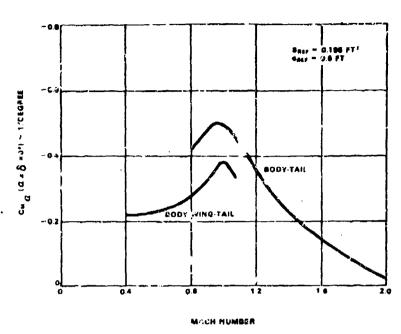


Fig 37. Pitching moment coefficient slope versus Mach number

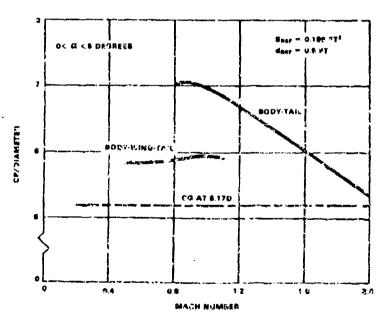


Fig 38. Center of pressure versus Mach number

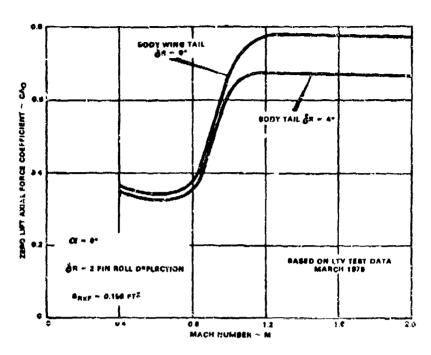


Fig 39. Axial force coefficient versus Mach number

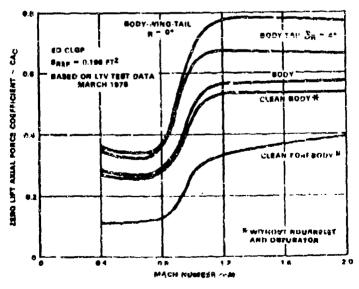


Fig 40. Axial force coefficient breakdown

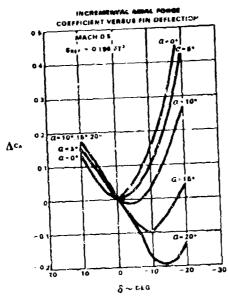


Fig 41. Incremental axial force coefficient versus fin deflection,  $M \approx 0.5$ 

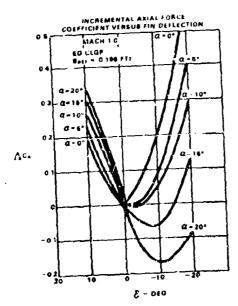


Fig. 43. Incremental axial force coefficient versus fin deflection,  $M \approx 1.0$ 

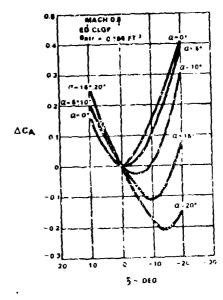


Fig 44. Incremental axial force coefficient versus fin deflection, M = 0.8

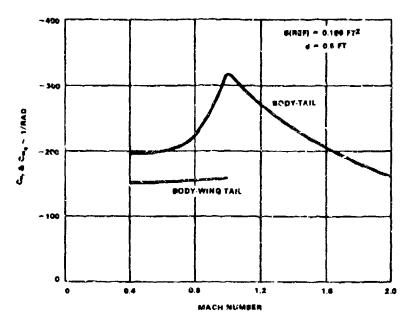


Fig 44. Pitch and yaw damping derivatives versus Mach number

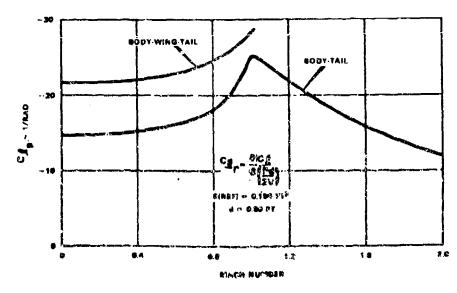


Fig 45. Roll damping derivative

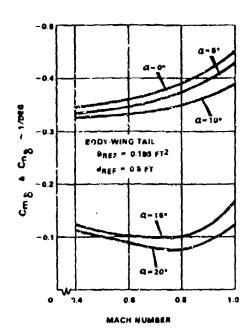


Fig 46. Fin power in pitch and yaw versus Mach number

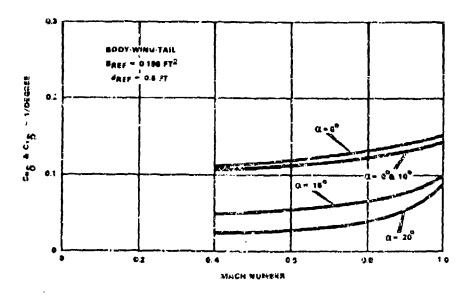


Fig 47. Normal force and side force coefficient slope with fin deflection versus Mach number

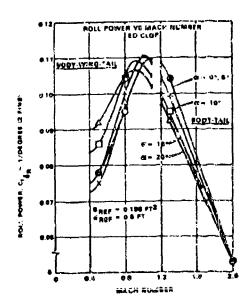
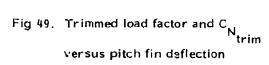
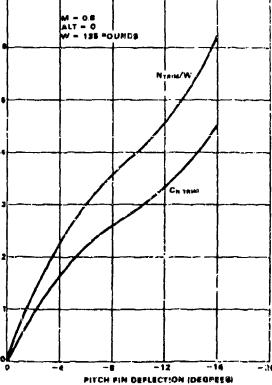


Fig 48. Roll power versus Mach number





## APPENDIX D

## CARMON-LAUNCHED GUIDED PROJECTILES RECOMMENDED WIND-TURNEL TEST PROGRAMS

Canand-controlled fixed-tail design

#### Early ED Wind Tunnel Test for Design Purposes

#### Test Outline

- 1. Body and Tail (controls undeflected, rolling & nonrolling).
  - A. Test Conditions (except as noted, number in parentheses is number of values of that variable)
    - 1. Mach No.: 0.4, 0.8, 0.9, 0.95, 1.0, 1.1, 1.25, 1.5, 2.0 (9)
    - 2. Angles of Attack: +6°, +4°, +2°, +1°, +0.5°, -1°, -2°, -4°, -6°, -8°, -10°, -12°, -14°, -16°, -18°, -20° (18)
    - 3. Yaw Angles: 0° (1)
    - 4. Roll Angles (N.A. when rolling): ψ, 22.5°, 45°, 67.5°, 90° (5)
    - 5. Roll Rates: pd/2V = 0, 0.0075, 0.015, 0.030 (4)
  - B. Number of Runs (one run is one angle of attack sweep).
    - 1. Mach = 0 8, Roll Angles = 0°, 90°, 180°, 270°:

(correct any model asymmetries detected.)

- 2. I. A. 1-5 (rolling) 27
  - contingency runs

13

3. L.A. 1-5 (nonrolling)

45

contingency runs

22

4. Total

111

- C. Revise design as required.
- II. Body and Tall and Canards (controls undeflected)
  - A. Test Conditions

•

1. Mach No.: 0.8, 6.9, 6.95, 1.0 (4)

2. Angles of Attack: Same as I
 3. Yaw Angles: Same as I (1)
 4. Roll Angles: Same as I (5)
 5. Roll Rat pd/2V = 0,0.015 (3)
 B. Number of Runs
 1. M = 0.8, Roll Angles = 0°, 90°, 180°, 270°: 4
 (correct asymmetries)
 2. II. A. (nonrolling)
 20
 contingency runs
 3. II. A. (rolling)

#### III. Body and Tail Canands (controls deflected)

contingency runs

## A. Test Conditions

4. Total

- 1. Mach No.: Same as it (4)
- 2. Angles of Attack: Same as 1
- 3. Yaw Angles: Same as I (1)
- 4. Roll Angles: A: 0°, 22.5°, 45°, 67.5°, 90° (5)

B: A plus 112.5°, 135°, 157.5° (8)

4

46

5. Roll Rates: pd/2V = 0, 0.0075, 0.015 (3)

## 6. Control Deflections

- a. Roll Program A at all Mach No.: (nonre!ling)
  pitch: +5°, -5°, -7.5°, -10° (4)
  yaw: 0° (1)
- b. Roll Program A at all Mach No.: (nonrolling)
  pitch: 0° (1)
  yaw: -5°, +5°, 7.5°, +10° (4)
- c. Roll Program B (nonrolling)
  pitch: +5°, -5°, -10° (3)
  yaw: -5°, +5°, +10° (3)

## B. Number of Runs

## 1. Nonrolling

- a. pitch deflection only:

  b. yaw deflection only:

  c. pitch and yaw

  80
- d. Total 288

## 2. Rolling

Ş

- a. pitch deflection only:b. yaw deflection only:
- c. pitch and yaw:d. Total

136

# C. Revise Design as Required

# IV. Grand Total of Runs: 741 (minimum)

# V. General Tast Considerations

## A. Test Melhods

1. Six component balance.

- 2. Base pressure measurements will be taken at least at 4 points.
- 3. Model will represent expected flight condition (either engraved obturator on or off).
  - 4. Flow visualization techniques will be used.

#### B. Test Models/Facilities

- 1. 0.5 percent blockage ratio not to be exceeded at full control deflections and zero angle of attack.
- 2. Test Reynolds number should be as close to flight Reynolds number as possible; and not below  $2 \times 10^6$  (based on diameter) at Mach 1.0.

#### 3. Facilities

- a. NASA Unitary Tunnels, Ames Laboratory.
- (1) High Reynolds Number. Can match flight on a full-scale model.
- (2) A full-scale model would have less than 0.5 percent blockage ratio.
- (3) Match number range is 0.7 to 1.4 in 11-foot by 11-foot and 1.5 to 2.5 in 9-foot by 7-foot tunnel.
  - (4) Available at no cost.
- (5) Availability of test time depends on national priority. (High Army priority means 6 to 12 month wait.)
  - (6) Low number of runs per hour (≈2)
  - b. CALSPAN 8-foot by 8-foot.
- (1) Capable of exceeding a Reynolds number of  $2 \times 10^6$  throughout controlled flight Mach number regime.
- (2) A full-scale model would have less than 0.5 percent blockage ratio.

- (3) Mach number range is 0.1 to 1.3.
- (4) Another tunnel is required for supersonic testing.
- (5) Cost is \$1500 per hour.
- (6) Test time available immediately.
- (7) Very high number of runs per hour ( $\approx$ 10) with remotely controlled spin and control surfaces.
  - c. AEDC 4T with Supersonic Blocks
- (1) Capable of exceeding a Reynolds number of  $2 \times 10^6$  at M=1.6 and 2.0.
- (2) Blockage requirements are not limiting for supersonic conditions.
  - (3) Mach numbers are 1.6 and 2.0.
- (4) This is considered the main choice tunnel for supersonic testing.
  - (5) Cost is \$720 per hour.
  - (6) Availability of test time depends upon DOD priority.
- (7) High number of runs per hour ( $\approx$ 6) with remotely controlled spin and control surfaces.
  - d. AEDC 16-foot by 16-foot.
- (1) Can maintain Re =  $2 \times 10^6$  (based on diameter) at all Mach numbers up to 1.6.
- (2) A full-scale model would not exceed 0.5 percent blockage.
  - (3) Cost is \$1400 per hour of tunnel occupancy.
  - (4) Availability of test time depends upon DOD priority.

(5) High number of runs per hour ( $\approx$ 6) with remotely controlled fins and spin.

## 4. Models

- a. Use of existing model would not allow spin control or remote control setting of fin deflections.
- b. Use of proposed 3/4 scale model would allow remote control of fins but would not allow spin control.
- c. (1) A model incorporating the features in (a) must be built.
- (2) The test time required for the transonic portion of the final test program is probably too long at any NASA tunnel.

## VI. Recommendations:

- A. The NASA tunnels have been discussed because they are available at no cost. But if a high national priority cannot be established, the time delay in getting into these tunnels renders them useless. Therefore, it is recommended that the CALSPAN 8-foot by 8-foot tunnel be used for transonic testing (it is available on call) and the AEDC 4T with supersonic blocks be used for supersonic testing.
- B. The same order of recommendations is made for the final aerodynamic data package required. Scheduling will be tighter here, and the NASA tunnels are definetely out.
- C. In light of the Reynolds number problem and the final configuration aerodynamic testing required later in ED, it is recommended that the early ED testing be done with a full-scale, remotely controlled spin and control surfaces model.

# Minimum Wind Tunnel Test Program of Final Configuration:

## Wind Tunnel Test Requirements.

- 1. Test configuration will be full-scale, preferably based on actual hardware to reduce model costs and for surface finish, and Reynolds' number matching.
- 2. Test configuration will be expected flight configuration, e.g., obturator either on or off as intended. If obturator is on, it should be engraved.
- 3. All tests will be made with a 6-componer t balance plus instrumentation to obtain hinge forces and moments on control surfaces. Base pressure will be measured.
- 4. The model must be capable of remote and independent control of all control surfaces and of model spin rate.
- 5. These surface variations must be set within 0.002° and data on all control variations and the spin rate must be available continuously during a tunnel run.
- 6. Base pressure measurements will be taken at least at one radius every 90°; this radius should be half-way between the sting and the edge of the base of the projectile. The pressure taps should be in the base and the plumbing routed inboard and then out along the sting. External rakes should not be used.
- 7. Data reduction will include plots of all force and moment coefficients as functions of all variables in test.
  - 8. Flow visualization techniques will be employed at all times.
- 9. Read also the Early ED Test Plan. Give special attention to Section V a discussion of Model/Facility choice.
- 10. If full-scale controllable model was used in early ED, the model is already available and paid for. Any testing done in early ED on same external configuration as final design doesn't have to be done again and their time and costs may be deducted from this plan.

## **Test Outline**

- 1. Body Alone
  - A. Test Condition (number in parentheses is number of values of that variable)
    - 1. Mach No.: 0.4, 0.6, 0.8, 0.9, 0.95, 1.0, 1.05, 1.1, 1.25, 1.50, 2.0 (11)
    - 2. Angles of Attack: +6°, +4°, +2°, +1°, 0.5°, 0°, -0.5°, -1°, -2°, -4°, -6°, -8°, -10°, -12°, -14°, -16°, -18°, -20° (18)
    - 3. Roll Angles: 0°, 22.5°, 45°, 67.5°, 90°, 180°, 270° (7)
    - 4. Yaw Angle: 0° (1)
  - B. Number of Runs (considering an angle of attack sweep as one run): 77
  - C. Any model asymmetries detected should be corrected and any flow asymmetries noted for correction of data.
- II. Body and Tail (rolling and nonrolling)
  - A. Test Conditions
    - 1. Mach No.: Same as I (11)
    - 2. Angles of Attack: Same as I.
    - 3. Roll Angles: 0°, 22.5°, 45°, 67.5°, 90°, 112.5°, 135°, 157.5°, except as noted (8)
    - 4. Yaw Angles: 0° (1)
    - 5. Roll Rates: pd/2V = 0, 0.0075, 0.015, 0.030 (4)
    - 6. Control Deflections: 0 (1)
  - B. Number of Runs

1. 
$$p = 0$$
,  $\phi = 0^{\circ}$ ,  $180^{\circ}$ ,  $270^{\circ}$ ,  $M = 0.8$ : 4 (Asymmetry check)

2. 
$$p = 0$$
:

88

3. 
$$p \neq 0$$
:

33

125

- C. Correct any model asymmetries detected in Ii.B.1 and note flow asymmetries.
- III. Body and Tail and Canards (No control deflections).
  - A. Test Conditions

#### B. Number of Runs

1. 
$$p = 0$$
: 40 runs

2. 
$$p \neq 0$$
: 15 runs

55 runs

- IV. Body and Tail and Canards (controls deflected, no roll rate)
  - A. Test Conditions are the same as the early ED plan except Mach No. are the same as III (5).
  - B. Number of Runs

1. pitch deflection only: 100

2. yaw deflection only: 100

3. pitch and yaw: 360

4. Total 560

# V. Body and Tail and Canards (controls deflected, rolling)

- A. Test Conditions are the same as IV.
- B. Number of Runs (same as early ED).
  - 1. pitch deflection only: 40
  - 2. yaw deflection only: 40
  - 3. pitch and yaw: 90
  - 4. Total 170

## VI. Dynamic Testing

- A. Test Conditions
  - 1. Mach No.:
    - a. Body: Same as I (11)
    - b. Body and Tail: Same as I (11)
    - c. Body and Tail and Canards: Same as III (5)
  - 2. Angles of attack: 0° (1)
  - 3. Roll Angles: 0°, 22.5°, 45° (3)
  - 4. Yaw Angles: 0°
  - 5. Roll Rates: 0º
  - 6. Control Deflections: All 0

- VI. A. 8. Configurations: Body, Body and Tail, Body and Tail and Canards (3)
  - B. Number of Runs

TOTAL: 81

- VII. Total Number of Runs
  - A. I: 77
  - B. II: 125
  - C. III: 55
  - D. IV: 560
  - E. V: 170
  - F. V!: 81
  - G. Total 1149
- VIII. Cost and Time
  - A. Model(s): \$50,000 (full-scale)

+\$20,000 if two tunnels are used.

- B. Tunnel Times (alternatives)
  - 1. Ames Unitary Tunnels: 575 hours
  - 2. CALSPAN 8' x 8' and Ames  $9' \times 7'$ : 118 + 32 = 150 hours
  - 3. CALSPAN 8'  $\times$  8' and AEDC 4T: 118 + 16 = 134 hours
- C. Tunnel Costs
  - 1. Ames Unitary Tunnels: 0
  - 2. CALSPAN 8'  $\times$  8' and Ames 9'  $\times$  7': \$177K + 0 = \$177K

- 3. CALSPAN 8' x 8' and AEDC 4T: \$177K + \$12K = \$189K
- D. Total Costs (model & tunnel time)
  - 1. Ames Unitary Tunnels: \$50K
  - 2. CALSPAN 8'  $\times$  8' and Ames 9'  $\times$  7': \$247K
  - 3. CALSPAN 8' x 8' and AEDC 4T: \$259K
- E. Estimated Priority Required to Obtain Tests on Time
  - 1. High priority at national level.
  - 2. Available immediately and high national priority.
  - 3. Available immediately and medium priority at DOD level.

# APPENDIX D

# CANNON-LAUNCHED GUIDED PROJECTILES RECOMMENDED WIND-TUNNEL TEST PROGRAMS

Fixed-wing tail-controlled design

# Early ED Wind Tunnel Test for Design Purposes

#### **Test Outline**

- 1. Body and Tail (controls undeflected, rolling and non-rolling)
- A. Test Conditions (number in parentheses is number of values of that variable)
  - 1. Mach No. 0.4, 0.8, 0.9, 0.95, 1.0, 1.1, 1.25, 1.50, 2.0 (9)
  - 2. Angles of Attack: +6°, +4°, +2°, +1°, +0.5, 0°, -0.5°, -1°, -4°, -6°, -8°, -10°, -12°, -14°, -16°, -18°, -20° (18).
  - 3. Yaw Angles: 0° (1).
  - 4. Roll Angles: 0°, 22.5°, 45°, 67.5°, 90° (5) except as noted.
  - 5. Roll Rates: pd/2V = 0, 0.015, 0.030 (3).
  - B. Number of Runs.
    - 1. Mach = 0.8, Roll Angles =  $0^{\circ}$ ,  $90^{\circ}$ ,  $180^{\circ}$ ,  $2/0^{\circ}$ : 4 (asymmetry check)
  - C. Revise design as required, correct model asymmetries.
- II. Body and Tail and Wing (controls undeflected, non-rolling)
  - A. Test conditions (except as noted).
    - 1. Mach No. 0.8, 0.9, 0.95, 1.0 (4)
    - 2. Same as I

- 3. Yaw Angles: 0° (1)
- 4. Roll Angles: 0°, 22.5°, 45°, 67.5°, 90° (5)
- B. Number of Runs (one run is one angle of attack sweep).
  - 1. Mach = 0.8, Roll Angles = 0°, 90°, 180°, 270°: & (asymmetry check)
  - 2. II. A. 1.-5.:

20

contingency runs

10

3. Total

34

- C. Revise design as required (correct model asymmetries).
- III. Body and Tail and Wing (controls deflected, no rolling).
  - A Test Conditions
    - 1. Mach No.: Same as II (4).
    - 2. Angles of Attack: Same as I.
    - 3. Yaw Angles: 0° (1).
    - 4. Roll Angles: A: 0°, 22.5°, 45°, 67.5°, 90° (5).
      - B: A plus 112.5°, 135°, 157.5° (8).
    - 5. Control Deflections:
      - a. Roll Program A at all Mach No.

yaw: 0° (1).

roll: 0° (1).

b. Roll Program A at all Mach No.

yaw: 
$$-5^{\circ}$$
,  $+5^{\circ}$ ,  $+10^{\circ}$ ,  $+8_{\text{Max}}$  (4).

roll: 0° (1).

c. Roll Program B at M = 0.8 and  $\delta_{\mbox{\scriptsize R}}$  = 5°, Program A elsewhere.

d. Roll Program B at M = 0.8, Program A elsewhere.

e. Roll Program B at M = 0.8, Program A elsewhere.

yaw: 
$$0^{\circ}$$
 (1).

roll: 
$$-5^{\circ}$$
,  $+5^{\circ}$  (2).

f. Roll Program B at M = 0.8, Program A elsewhere.

g. Roll Program B at M = 0.8, Program A elsewhere.

pitch: +5°, -5° (2).

yaw:  $-5^{\circ}$ ,  $+5^{\circ}$  (2).

roll:  $-5^{\circ}$ ,  $+5^{\circ}$  (2).

E. Number of Runs.

- 1. pitch deflection only: 80
- 2. yaw deflection only: 80
- 3. roll differential deflection only: 63
- 4. pitch and yaw: 207
- 5. pitch and roll: 92
- 6. yaw and roll: 92
- 7. pitch, yaw, and roll: 184
- 8. Total 798

C. Revise design as required

IV. Grand Total of Runs:

930 (minimum)

- V. Grand Test Considerations.
  - A. Test Methods.
    - 1. 6-component balance.
    - 2. Base pressure measurements will be taken at least at 4 points.
- 3. Model will represent expected flight condition (either engraved obturator on or off).
  - 4. Flow visualization techniques will be used.

#### B. Test Models/Facilities.

- 1. 0.5% blockage ratio not to be exceeded at full control deflections and zero angle of attack.
- 2. Test Reynolds number should be as close to flight Reynolds number as possible; and not below  $2 \times 10^6$  (based on diameter) at Mach 1.0.

#### 3. Facilities.

- a. NASA Unitary Tunnels, Ames Laboratory.
- (1) High Reynolds number can match flight on a full-scale model.
- (2) A full-scale model would have less than 0.5% blockage ratio.
- (3) Mach number range is 0.7 to 1.4 in 11-foot by 11-foot and 1.5 to 2.5 in 9-foot by 7-foot tunnel.
  - (4) Available at no cost.
- (5) Availability of test time depends on national priority. (High Army priority means 6 to 12 month wait.)
  - (6) Low number of runs per hour (≈2).
  - b. CALSPAN 8-foot by 8-foot.
- (1) Capable of exceeding a Raynolds' number of  $2\times 10^6$  throughout controlled flight Mach number regime.
- (2) A full-scale model would have less than 0.5% blockage ratio.
  - (3) Mach number range is 0.1 to 1.3.
  - (4) Another tunnel is required for supersonic testing.
  - (5) Cost is \$1500 per hour.

- (6) Test time available immediately.
- (7) Very high number of runs per hour (≈10) with remotely controlled spin and control surfaces.
  - c. AEDC 4T with Supersonic Blocks.
- (1) Capable of exceeding a Reynolds' number of  $2 \times 10^6$  at M = 1.6 and 2.0.
- (2) Blockage requirements are not limiting for supersonic conditions.
  - (3) Mach numbers are 1.5 and 2.0.
- (4) This is considered the main choice tunnel for supersonic testing.
  - (5) Cost is \$720 per hour.
  - (6) Availability of test time depends upon DOD priority.
- (7) High number of runs per hour (≈6) with remotely controlled spin and control surfaces.
  - d. AEDC 16-foot by 16-foot.
- (1) Can maintain Re =  $2 \times 10^6$  (based on diameter) at all Mach numbers up to 1.6.
  - (2) A full-scale model would not exceed 0.5% blockage.
  - (3) Cost is \$1400 per hour of tunnel occupancy.
  - (4) Availability of test time depends upon DOD priority.
- (5) High number of runs per hour ( $\approx$ 6) with remotaly controlled fins and spin.

#### 4. Models

a. Use of existing model would not allow spin control or remote control setting of fin deflections.

- b. Use of proposed 3/4-scale model would allow remote control of fins but would not allow spin control.
- c. (1) A model incorporating the features in (a) must be built.
- (2) The test time required for the transonic portion of the final test program is probably too long at any NASA tunnel.

#### VI. Recommendations:

- A. The NASA tunnels have been discussed because they are available at no cost. But if a high national priority cannot be established, the time delay in getting into these tunnels renders them useless. Therefore, it is recommended that the CALSPAN 8-foot by 8-foot tunnel be used for transonic testing (it is available on call) and the AEDC 4T with supersonic blocks be used for supersonic testing.
- B. The same order of recommendations is made for the final aero-dynamic data package required. Scheduling will be tighter here and the NASA tunnels are definitely out.
- C. In light of the Reynolds' number problem and the final configuration aerodynamic testing required later in ED, it is recommended that the early ED testing be done with a full-scale, remotely controlled spin and control surfaces model.

## Minimum Wind Tunnel Test Program of Final Configuration:

## Wind Tunnel Test Requirements.

- 1. Test configuration will be full-scale, preferably based on actual hardware to reduce model costs and for surface finish, and Reynolds' number matching.
- 2. Test configuration will be expected flight configuration, e.g., obturator either on or off as intended. If obturator is on, it should be engraved.
- 3. All tests will be made with a 6-component balance plus instrumentation to obtain hinge forces and moments on control surfaces. Base pressure will be measured.
- 4. The model must be capable of remote and independent control of all control surfaces and of model spin rate.
- 5. These surface variations must be set within 0.002° and data on all control variations and the spin rate must be available continuously during a tunnel run.
- 6. Base pressure measurements will be taken at least at one radius every 90°; this radius should be half-way between the sting and the edge of the base of the projectile. The pressure taps should be in the base and the plumbing routed inboard and then out along the sting. External rakes should not be used.
- 7. Data reduction will include plots of all force and moment coefficients as functions of all variables in test.
  - 8. Flow visualization techniques will be employed at all times.
- 9. Read also the Early ED Test Plan. Give special attention to Section V a discussion of Model/Facility choice.
- 10. If full-scale controllable model was used in early ED, the model is already available and paid for. Any testing done in early ED on same external configuration as final design doesn't have to be done again and their time and costs may be deducted from this plan.

# Test Outline

- 1. Body Alone
  - A. Test Conditions (number in parentheses is number of values of that variable)
    - 1. Mach No.: 0.4, 0.6, 0.8, 0.9, 0.95, 1.0, 1.05, 1.1, 1.25, 1.50, 2.0 (11)
    - 2. Angles of Attack:  $+6^{\circ}$ ,  $+4^{\circ}$ ,  $+2^{\circ}$ ,  $+1^{\circ}$ ,  $0.5^{\circ}$ ,  $-0.5^{\circ}$ ,  $-1^{\circ}$ ,  $-2^{\circ}$ ,  $-4^{\circ}$ ,  $-6^{\circ}$ ,  $-8^{\circ}$ ,  $-10^{\circ}$ ,  $-12^{\circ}$ ,  $-14^{\circ}$ ,  $-16^{\circ}$ ,  $-18^{\circ}$ ,  $-20^{\circ}$  (18)
    - 3. Roll Angles: 0°,
- 90°, 180°, 270° (4)
- 4. Yaw Angle: 0° (1)
- B. Number of Runs (an angle of attack sweep is one run):
  - 1. Total 44
- C. Any model asymmetries detected should be corrected and flow asymmetries noted for data correction.
- II. Body and Tail (rolling and non-rolling).
  - A. Test Conditions.
    - 1. Mach No.: Same as I (11)
    - 2. Angles of Attack: Same as 1.
    - 3. Roll Angles: 0°, 22.5°, 45°, 67.5°, 90° (5) except as noted
    - 4. Yaw Angles: 0° (1)
    - 5. Roll Rates: pd/2V = 0, 0.015, 0,030 (3)
    - 6. Control Deflections: all 0, (1)  $\delta R = -2^{\circ}$ ,  $-5^{\circ}$  (2)
  - B. Number of Runs

1. 
$$p = 0$$
, all  $\delta = 0$ ,  $\phi = 0^{\circ}$ ,  $180^{\circ}$ ,  $270^{\circ}$ ,  $M = 0.8$ : 4 (asymmetry check)

2. 
$$p \neq 0$$
, all  $\delta = 0$ 

3. 
$$p = 0$$
,  $\delta_R \neq 0$ 

4. Total

- C. Correct any model asymmetries detected in II. B. 1. and note flow asymmetries for data correction.
- III. Body and Tail and Wing (no control deflection, non-rolling)
  - A. Test Conditions
    - 1. Mach No.: 0.4, 0.8, 0.9, 0.95, 1.0 (5)
    - 2. Angles of Attack: Same as I
    - 3. Roll Angles: 0°, 22.5°, 45°, 67.5°, 90°, 112.5°, 135°, 157.5° (8)
    - 4. Yaw Angles: 0° (1)
    - 5. Roli Rates: 0 (1)
    - 6. Control Deflections: Same as II (1)
  - B. Number of Runs:

1. 
$$p = 0$$
, all  $\delta = 0$ : 40

- 2. Total
- 40
- IV. Body and Tail and Wing (controls deflected, no roll rate)
  - A. Test Conditions are the same as the early ED plan except Match No. same as III (5)
  - B. Number of Runs:

1.	pitch deflection only:	100
2.	yaw deflection only:	100
3.	roll differential deflection only:	78
4.	pitch and yaw deflections:	252
5.	yaw and roll deflections:	112
6.	yaw and roll deflections:	112
7.	pitch, yaw, and roll deflections:	224
8.	Total	978

# V. Dynamic Testing

## A. Test Conditions

- 1. Mach No.:
  - a. Body: Same as I (11)
  - b. Body and Tail: Same as I (11)
  - c. Body and Tail and Wing: Same as III (5)
- 2. Rol! Angles: 0°, 22.5°, 45° (3)
- 3. Yaw Angles: 0 (1)
- 4. Roll Rates: 0 (1)
- 5. Control Deflections: A110
- 6. Configurations: Body, Body and Tail, Body and Tail and Wing (3)

## B. Number of Runs

1. Total 81

# VI. Grand Total of Runs Required

- A. 1 44
- B. II 136
- C. ili 40
- D. IV 978
- E. V 81
- F. Total 1279

#### VII. Cost and Time

- A. Model(s): \$50,000 (full-scale) +\$20,000 if two tunnels are used.
- B. Tunnel Times (alternatives):
  - 1. Ames Unitary Tunnels: 656 hours
  - 2. CALSPAN 8' x 8' and Ames 9' x 7' : 132 + 30 = 162 hours
  - 3. CALSPAN 8' x 8' and AEDC 4T: 132 +16 = 148 hours
- C. Tunnel Costs
  - 1. Ames Unitary Tunnels: 0
  - 2. CALSPAN 8' x 8' and Ames  $9' \times 7'$ : \$1.98K + 0 = \$1.98K
  - 3. CALSPAN 8' x 8' and AEDC 4T: \$198K + \$12K = \$210K
- D. Total Costs (model and tunnel time)
  - 1. Ames Unitary tunnels: \$50K
  - 2. CALSPAN 8' x 8' and Ames 9' x 7' : \$268K
  - 3. CALSPAN 8' x 8' and AEDC 4T: \$280K

- E. Estimated Priority Required to Obtain Tests on Time
  - 1. High priority at national level
  - 2. Available immediately and high national priority
  - 3. Available immediately and medium priority at DOD level

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